505-41-34

Interface Control Document Between EOSDIS Core System (ECS) and Aster Ground Data System

Revision A

July 1997

National Aeronautics and Space Administration

Goddard Space Flight Center
Greenbelt, Maryland

Interface Control Document Between EOSDIS Core System (ECS) and Aster Ground Data System

Reviewed by:

Mathew Schwaller	Date
Science Data and External Interface Manager	
GSFC - Code 505	

Candace Carlisle	Date
Interface Manager ESDIS Project	
GSFC - Code 505	

Approved by:

Arthur F. Obenschain	Date
ESDIS Project Manager	
GSFC - Code 423	

Hiroshi Watanabe	Date
Project Manager	
ASTER Ground Data System	

Goddard Space Flight Center
Greenbelt, Maryland

This page intentionally left blank.

Preface

This document is a formal contract deliverable with an approval code 1. It requires Government review and approval prior to acceptance and use. This document is under ESDIS Project configuration control. Once this document is approved, Contractor approved changes are handled in accordance with Class I and Class II change control requirements described in the EOS Configuration Management Plan, and changes to this document shall be made by document change notice (DCN) or by complete revision.

Any questions should be addressed to:

Configuration Management Office
Code 505
The ESDIS Project Office
Goddard Space Flight Center
Greenbelt, MD 20771

This page intentionally left blank.

Abstract

This Interface Control Document (ICD) defines the functional and physical design of each interface between ECS and the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Ground Data System (GDS), and includes the precise data contents and format for each interface. All modes (options) of data exchange for each interface are described as well as the conditions required for each mode or option. Additionally, data rates, duty cycles, error conditions, and error handling procedures are included. Communications protocols and physical media are detailed for each interface.

This ICD is consistent with the ECS/ASTER GDS interface requirements, as described in the ASTER Memoranda of Understanding (MOU), the ASTER Project Implementation Plan (PIP), the Earth Science Data and Information System (ESDIS) Project -- Level 2 Requirements, the Functional and Performance Requirements Specification for the Earth Observing System Data and Information System (EOSDIS) Core System (ECS Level 3 requirements), and the Interface Requirement Document (IRD) Between ECS and MITI ASTER GDS.

Keywords: ASTER, Japan, ICD, interface, EDC, EBnet, International Partner, AM-1, DAR, IST, interoperability, EOC, ICC, DCE, SNMP

This page intentionally left blank.

Change Information Page

ISSUE	DATE	PAGES AFFECTED	DESCRIPTION
Baseline	03-20-97	All	CCR 505-41-34-001
Revision A	07/23/97	All	CCR 505-41-34-002-A
CH01	08/09/97	vii, ix, x, 8-4	CCR 505-41-34-003

This page intentionally left blank.

List of Affected Pages

Page No.	Revision	Page No.	Revision	Page No.	Revision	Page No.	Revision
i	Revision A	xxii	Revision A	4-7	Revision A	5-6	Revision A
ii	Revision A	1-1	Revision A	4-8	Revision A	5-7	Revision A
iii	Revision A	1-2	Revision A	4-9	Revision A	5-8	Revision A
iv	Revision A	1-3	Revision A	4-10	Revision A	5-9	Revision A
v	Revision A	1-4	Revision A	4-11	Revision A	5-10	Revision A
vi	Revision A	2-1	Revision A	4-12	Revision A	5-11	Revision A
vii	CH01	2-2	Revision A	4-13	Revision A	5-12	Revision A
viii	Revision A	2-3	Revision A	4-14	Revision A	5-13	Revision A
ix	CH01	2-4	Revision A	4-15	Revision A	5-14	Revision A
x	CH01	2-5	Revision A	4-16	Revision A	5-15	Revision A
xi	Revision A	2-6	Revision A	4-17	Revision A	5-16	Revision A
xii	Revision A	3-1	Revision A	4-18	Revision A	5-17	Revision A
xiii	Revision A	3-2	Revision A	4-19	Revision A	5-18	Revision A
xiv	Revision A	3-3	Revision A	4-20	Revision A	5-19	Revision A
xv	Revision A	3-4	Revision A	4-21	Revision A	5-20	Revision A
xvi	Revision A	4-1	Revision A	4-22	Revision A	5-21	Revision A
xvii	Revision A	4-2	Revision A	5-1	Revision A	5-22	Revision A
xviii	Revision A	4-3	Revision A	5-2	Revision A	5-23	Revision A
xix	Revision A	4-4	Revision A	5-3	Revision A	5-24	Revision A
xx	Revision A	4-5	Revision A	5-4	Revision A	5-25	Revision A
xxi	Revision A	4-6	Revision A	5-5	Revision A	5-26	Revision A

List of Affected Pages

Page No.	Revision	Page No.	Revision	Page No.	Revision	Page No.	Revision
5-27	Revision A	6-18	Revision A	7-1	Revision A	A-6	Revision A
5-28	Revision A	6-19	Revision A	7-2	Revision A	B-1	Revision A
5-29	Revision A	6-20	Revision A	8-1	Revision A	B-2	Revision A
5-30	Revision A	6-21	Revision A	8-2	Revision A	B-3	Revision A
6-1	Revision A	6-22	Revision A	8-3	Revision A	B-4	Revision A
6-2	Revision A	6-23	Revision A	8-4	CH01	B-5	Revision A
6-3	Revision A	6-24	Revision A	8-5	Revision A	B-6	Revision A
6-4	Revision A	6-25	Revision A	8-6	Revision A	B-7	Revision A
6-5	Revision A	6-26	Revision A	8-7	Revision A	B-8	Revision A
6-6	Revision A	6-27	Revision A	8-8	Revision A	B-9	Revision A
6-7	Revision A	6-28	Revision A	9-1	Revision A	B-10	Revision A
6-8	Revision A	6-29	Revision A	9-2	Revision A	B-11	Revision A
6-9	Revision A	6-30	Revision A	9-3	Revision A	B-12	Revision A
6-10	Revision A	6-31	Revision A	9-4	Revision A	B-13	Revision A
6-11	Revision A	6-32	Revision A	9-5	Revision A	B-14	Revision A
6-12	Revision A	6-33	Revision A	9-6	Revision A	B-15	Revision A
6-13	Revision A	6-34	Revision A	A-1	Revision A	B-16	Revision A
6-14	Revision A	6-35	Revision A	A-2	Revision A	B-17	Revision A
6-15	Revision A	6-36	Revision A	A-3	Revision A	B-18	Revision A
6-16	Revision A	6-37	Revision A	A-4	Revision A	B-19	Revision A
6-17	Revision A	6-38	Revision A	A-5	Revision A	B-20	Revision A

List of Affected Pages

Page No.	Revision	Page No.	Revision	Page No.	Revision	Page No.	Revision
B-21	Revision A	C-2	Revision A	C-23	Revision A	D-12	Revision A
B-22	Revision A	C-3	Revision A	C-24	Revision A	D-13	Revision A
B-23	Revision A	C-4	Revision A	C-25	Revision A	D-14	Revision A
B-24	Revision A	C-5	Revision A	C-26	Revision A	D-15	Revision A
B-25	Revision A	C-6	Revision A	C-27	Revision A	D-16	Revision A
B-26	Revision A	C-7	Revision A	C-28	Revision A	D-17	Revision A
B-27	Revision A	C-8	Revision A	C-29	Revision A	D-18	Revision A
B-28	Revision A	C-9	Revision A	C-30	Revision A	D-19	Revision A
B-29	Revision A	C-10	Revision A	C-31	Revision A	D-20	Revision A
B-30	Revision A	C-11	Revision A	C-32	Revision A	D-21	Revision A
B-31	Revision A	C-12	Revision A	D-1	Revision A	D-22	Revision A
B-32	Revision A	C-13	Revision A	D-2	Revision A	D-23	Revision A
B-33	Revision A	C-14	Revision A	D-3	Revision A	D-24	Revision A
B-34	Revision A	C-15	Revision A	D-4	Revision A	D-25	Revision A
B-35	Revision A	C-16	Revision A	D-5	Revision A	D-26	Revision A
B-36	Revision A	C-17	Revision A	D-6	Revision A	D-27	Revision A
B-37	Revision A	C-18	Revision A	D-7	Revision A	D-28	Revision A
B-38	Revision A	C-19	Revision A	D-8	Revision A	D-29	Revision A
B-39	Revision A	C-20	Revision A	D-9	Revision A	D-30	Revision A
B-40	Revision A	C-21	Revision A	D-10	Revision A	D-31	Revision A
C-1	Revision A	C-22	Revision A	D-11	Revision A	D-32	Revision A

List of Affected Pages

Page No.	Revision	Page No.	Revision	Page No.	Revision	Page No.	Revision
D-33	Revision A	D-54	Revision A	D-75	Revision A	D-96	Revision A
D-34	Revision A	D-55	Revision A	D-76	Revision A	D-97	Revision A
D-35	Revision A	D-56	Revision A	D-77	Revision A	D-98	Revision A
D-36	Revision A	D-57	Revision A	D-78	Revision A	D-99	Revision A
D-37	Revision A	D-58	Revision A	D-79	Revision A	D-100	Revision A
D-38	Revision A	D-59	Revision A	D-80	Revision A	D-101	Revision A
D-39	Revision A	D-60	Revision A	D-81	Revision A	D-102	Revision A
D-40	Revision A	D-61	Revision A	D-82	Revision A	D-103	Revision A
D-41	Revision A	D-62	Revision A	D-83	Revision A	D-104	Revision A
D-42	Revision A	D-63	Revision A	D-84	Revision A	D-105	Revision A
D-43	Revision A	D-64	Revision A	D-85	Revision A	D-106	Revision A
D-44	Revision A	D-65	Revision A	D-86	Revision A	D-107	Revision A
D-45	Revision A	D-66	Revision A	D-87	Revision A	D-108	Revision A
D-46	Revision A	D-67	Revision A	D-88	Revision A	D-109	Revision A
D-47	Revision A	D-68	Revision A	D-89	Revision A	D-110	Revision A
D-48	Revision A	D-69	Revision A	D-90	Revision A	D-111	Revision A
D-49	Revision A	D-70	Revision A	D-91	Revision A	D-112	Revision A
D-50	Revision A	D-71	Revision A	D-92	Revision A	D-113	Revision A
D-51	Revision A	D-72	Revision A	D-93	Revision A	D-114	Revision A
D-52	Revision A	D-73	Revision A	D-94	Revision A	D-115	Revision A
D-53	Revision A	D-74	Revision A	D-95	Revision A	D-116	Revision A

List of Affected Pages

Page No.	Revision	Page No.	Revision	Page No.	Revision	Page No.	Revision
D-117	Revision A	D-138	Revision A	AB-1	Revision A		
D-118	Revision A	D-139	Revision A	AB-2	Revision A		
D-119	Revision A	D-140	Revision A				
D-120	Revision A	D-141	Revision A				
D-121	Revision A	D-142	Revision A				
D-122	Revision A	D-143	Revision A				
D-123	Revision A	D-144	Revision A				
D-124	Revision A	D-145	Revision A				
D-125	Revision A	D-146	Revision A				
D-126	Revision A	D-147	Revision A				
D-127	Revision A	D-148	Revision A				
D-128	Revision A	D-149	Revision A				
D-129	Revision A	D-150	Revision A				
D-130	Revision A	D-151	Revision A				
D-131	Revision A	D-152	Revision A				
D-132	Revision A	D-153	Revision A				
D-133	Revision A	D-154	Revision A				
D-134	Revision A	D-155	Revision A				
D-135	Revision A	D-156	Revision A				
D-136	Revision A	D-157	Revision A				
D-137	Revision A	D-158	Revision A				

This page intentionally left blank.

Contents

1. Introduction

2. Related Documentation

3. Interface Overview

4. Data Exchange Framework

5. Interfaces Between the ECS FOS and the ASTER GDS AOS

6. Interfaces Between the ECS SDPS and the ASTER GDS SDPS

List of Figures

List of Tables

Appendix A. Work-Off Plan

Appendix B. ODL Message Keywords (Objects)

Appendix C. DAR Client API List

Appendix D. ASTER Level 1 Data Products Specification (GDS Version)

ABBREVIATIONS AND ACRONYMS

1. Introduction

1.1 Identification

This Interface Control Document (ICD), Contract Data Requirement List (CDRL) item 029, whose requirements are specified in Data Item Description (DID) 209/SE1, is a required deliverable under the Earth Observing System (EOS) Data and Information System (EOSDIS) Core System (ECS), Contract (NAS5-60000).

1.2 Scope

This ICD defines all of the system interfaces that exist between ECS and the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Ground Data System (GDS).

ECS Releases are keyed to mission support: Release Ir1 provides support to the Tropical Rainfall Measuring Mission (TRMM) Early Interface Testing and Science Algorithm I&T. Release A provides support to TRMM Science Operations and TRMM Ground Systems Certification Testing. Release A also provides the functional capabilities needed to support early ESDIS Ground System Testing for the EOS AM-1 and Landsat 7 missions. Release B provides support to EOS AM-1 Mission Operations and Science Operations, and provides support to ESDIS Ground System Certification Testing for the EOS AM-1 and Landsat 7 missions. Release B also provides archive and distribution services for the Landsat 7 mission. Releases C and D provide evolutionary enhancements to the ECS services provided in the earlier Releases.

The ESDIS Project has joint responsibility with the ASTER GDS Project for the development and maintenance of this ICD. Any changes in the interface must be agreed to by the relevant participating parties, and then assessed at the ESDIS Project Level. This ICD will be approved under the signatures of the ESDIS and the Earth Remote Sensing Data Analysis Center (ERSDAC) ASTER GDS Project Managers.

This document reflects the technical baseline maintained by the ECS Configuration Control Board in accordance with ECS technical direction (see Section 2.2).

1.3 Purpose and Objectives

This document is written to formalize the interpretation and general understanding of the interface between ECS and the ASTER GDS. This document provides clarification and elaboration of the ECS-ASTER GDS interfaces to the extent necessary to assure hardware, software, and operational service compatibility within the end-to-end system.

This document provides a point of mutual control of external interface definitions by ESDIS and the ASTER GDS Project**.**

1.4 Status and Schedule

This is the final baseline version of the ICD for the definition of interfaces between the ECS and the ASTER GDS.

A Work-Off Plan for any TBD, TBR, and TBS items associated with the ECS implementation has been included in Appendix A. This Work-Off Plan provides the following information:

a. ICD I/F Issue Number

b. ICD Reference Paragraph

c. ICD Issue Priority

d. ICD Issue Type - Description

e. Work-off Plan Task(s)

f. Projected Resolution Date

g. Risk Assessment

Appendix B contains the ODL Message Keywords (Objects).

Appendix C contains the ASTER-GDS IMS DAR Client API List.

Appendix D contains the ASTER Level 1 Data Product Specification (GDS Version).

This ICD will now be submitted as a Configuration Control Board (CCB) approval Code 1 document. At the option of the ESDIS Project, this document may be designated to be under full ESDIS CCB control. Changes may be submitted for consideration by Contractor and ESDIS CCBs under the normal change process at any time.

1.5 Organization

This document is organized in 9 sections plus appendices. Section 2 contains information about documentation relevant to this ICD, including parent, applicable, and information documents. Section 3 provides an overview of the ECS-ASTER GDS interfaces, with a brief description of the interfaces involved. Section 4 provides an overview of the data exchange framework. Sections 5 through 9 contain descriptions of ECS-ASTER GDS data flows, including data format and content, the data transfer method(s), and error handling. Appendix A provides the Work-Off Plan supporting resolution of issues and closures of TBD, TBR and/or TBS items. Appendix B identifies and defines ODL Message Keywords (Objects), Appendix C provides the ASTER DAR Client API List, and Appendix D contains the ASTER Level 1 Data Products Specifications (GDS Version). Acronyms and abbreviations are also included.

1.6 Document Change Procedure

Changes to the terms and conditions of this document can be initiated by either party and changed only by mutual agreement of both parties. Proposed changes to this document must be approved by both the NASA ESDIS Project and ASTER Project CCBs. The EDIS Project CCB responsibility for this document is established in accordance with the requirements of the Earth Observing System Configuration Management Plan, 420-02-02. The ASTER Project CCB responsibility for this document is established in accordance with the requirements of the document, ERSDAC AG-E-S-0004.

This page intentionally left blank.

2. Related Documentation

2.1 Parent Documents

The following documents are the parents from which this document's scope and content derive:

193-208-SE1-001	Methodology for Definition of External Interfaces for the ECS Project
304-CD-001-003	Flight Operations Segment (FOS) Requirements Specification for the ECS Project, Volume 1: General Requirements
304-CD-004-003	Flight Operations Segment (FOS) Requirements Specification for the ECS Project, Volume 2: AM-1 Mission Specific
304-CD-005-001	Release B SDPS/CSMS System Requirements for the ECS Project
423-41-01	Goddard Space Flight Center, EOSDIS Core System (ECS) Statement of Work
423-41-02	Goddard Space Flight Center, Functional and Performance Requirements Specification for the Earth Observing System Data and Information System (EOSDIS) Core System (ECS)
423-41-18	Goddard Space Flight Center, Interface Requirements Document Between Earth Observing System Data and Information System (EOSDIS) and MITI ASTER GDS Project
None	Memorandum of Understanding Between the United States National Aeronautics And Space Administration and the Ministry of International Trade and Industry of Japan concerning Cooperation in the Flight of the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) on the NASA Polar Orbiting Platform and Related Support for an International Earth Observing System
None	Project Implementation Plan, Volume II - Ground Data System, Advanced Spaceborne Thermal Emission and Reflection Radiometer and ESDIS and EOS-AM Projects

2.2 Applicable Documents

The following documents are referenced herein and are directly applicable to this document. In the event of conflict between any of these documents and this document, this document shall take precedence.

209-CD-001-003	Interface Control Document Between the EOSDIS Core System (ECS) and the NASA Science Internet (NSI)

505-10-35	Data Format Control Document for the Earth Observing System (EOS) AM-1 Project Data Base
209-CD-005-005	Interface Control Document Between the EOSDIS Core System (ECS) and Science Computing Facilities (SCF)
220-CD-001-004	Communications Requirements for the ECS Project
305-CD-004-001	Overview of Release A SDPS and CSMS System Design Specification for the ECS Project
305-CD-012-001	Release A CSMS Communications Subsystem Design Specification for the ECS Project
305-CD-020-002	Overview of Release B SDPS and CSMS System Design Specification for the ECS Project
305-CD-021-002	Release B SDPS Client Subsystem Design Specification for the ECS Project
305-CD-022-002	Release B SDPS Interoperability Subsystem Design Specification for the ECS Project
305-CD-023-002	Release B SDPS Data Management Subsystem Design Specification for the ECS Project
305-CD-024-002	Release B SDPS Data Server Subsystem Design Specification for the ECS Project
305-CD-025-002	Release B SDPS Ingest Subsystem Design Specification for the ECS Project
305-CD-026-002	Release B SDPS Planning Subsystem Design Specification for the ECS Project
305-CD-028-002	Release B CSMS Communications Subsystem Design Specification for the ECS Project
305-CD-029-002	Release B CSMS System Management Subsystem Design Specification for the ECS Project
305-CD-030-002	Release B GSFC Distributed Active Archive Center Design Specification for the ECS Project
305-CD-033-002	Release B EDC Distributed Active Archive Center Design Specification for the ECS Project
305-CD-034-002	Release B ASF Distributed Active Archive Center Design Specification for the ECS Project
305-CD-035-002	Release B NSIDC Distributed Active Archive Center Design Specification for the ECS Project

305-CD-036-002	Release B JPL Distributed Active Archive Center Design Specification for the ECS Project
305-CD-037-002	Release B ORNL Distributed Active Archive Center Design Specification for the ECS Project
305-CD-038-002	Release B System Monitoring and Coordination Center Design Specification for the ECS Project
305-CD-040-001	Flight Operations Segment (FOS) Design Specification for the ECS Project (Segment Level Design)
305-CD-041-001	Flight Operations Segment (FOS) Planning and Scheduling Design Specification for the ECS Project
305-CD-042-001	Flight Operations Segment (FOS) Command Management Design Specification for the ECS Project
305-CD-043-001	Flight Operations Segment (FOS) Command Design Specification for the ECS Project
305-CD-048-001	Flight Operations Segment (FOS) User Interface Design Specification for the ECS Project
305-CD-049-001	Flight Operations Segment (FOS) Data Management Design Specification for the ECS Project
311-CD-002-004	Science Data Processing Segment (SDPS) Database Design and Database Schema Specifications for the ECS Project
210-TP-001-006	Technical Baseline for the ECS Project, 2/14/96
none	Goddard Space Flight Center, ECS Technical Direction No. 11, "PDR Technical Baseline," 12/6/94
CCSDS 301.0-B-2	Consultative Committee for Space Data Systems (CCSDS), Time Code Formats, Blue Book, Issue 2
CCSDS 641.0-B-1	Consultative Committee for Space Data Systems (CCSDS), Parameter Value Language Specification (CCSD0006), Blue Book
CCSDS 641.0-G-1	Consultative Committee for Space Data Systems (CCSDS), Report Concerning Space Data System Standards, Parameter Value Language - A Tutorial, Green Book
ISBN 1-884133-12-6	Jamsa Press, Internet Programming, K. Jamsa, Ph.D. and K. Cope
ISO 7498	International Organization for Standardization, Basic Reference Model for Systems Interconnection
RFC791	Internet Protocol, J. Postel
RFC793	Transmission Control Protocol, J. Postel

RFC821	Simple Mail Transfer Protocol (SMTP), J. Postel
RFC959	File Transfer Protocol, Internet Standards, J. Postel and J. Reynolds
RFC977	Network News Transfer Protocol: A Proposed Standard for the Stream-Based Transmission of News, B. Kantor, P. Lapsley
RFC1213	Management Information Base for Network Management of TCP/IP-based Internets: MIB-II, K. McCloghrie and M. Rose
RFC1510	The Kerberos Network Authentication Service (V5), J. Kohl and B. Neuman
552-FDD-96/010R0UD0	Goddard Space Flight Center, Earth Observing System (EOS) - AM1 Flight Dynamics Facility (FDF)/ECS Interface Control Document
None	Fujitsu, Ltd., ASTER Level 1 Data Products Specification (Science Version)
609-CD-005-001	EOSDIS Core System Project, Flight Operations Segment (FOS) Operations Tools Manual for the ECS Project

2.3 Information Documents

The following documents, although not directly applicable, amplify or clarify the information presented in this document, but are not binding.

194-201-SE1-001	Systems Engineering Plan for the ECS Project
194-202-SE1-001	Standards and Procedures for the ECS Project
205-CD-001-002	Science Users Guide and Operations Procedure Handbook
333-CD-003-002	SDP Toolkit Users Guide for the ECS Project
604-CD-001-004	Operations Concept for the ECS Project: Part 1 -- ECS Overview
604-CD-002-003	EOSDIS Core System Project, Operations Concept for the ECS Project: Part 2 -- Release B
604-CD-004-001	EOSDIS Core System Project, Operations Concept for the ECS Project: Part 2 -- FOS
814-RD-003-002	SDP Toolkit 5 Version Description Document (VDD) for the ECS Project
175-WP-001-001	HDF-EOS Primer for Version 1 EOSDIS for the ECS Project (White Paper)
194-TP-285-001	ECS Glossary of Terms

420-TP-001-005	Proposed ECS Core Metadata Standard, Release 2.0
343-TP-001-001	IST Capabilities Document for the ECS Project
None	ASTER Science Team, ASTER Functional Requirements for Mission Operations
None	Committee on Earth Observations Satellites (CEOS) Working Group on Data, Guidelines for an International Interoperable Catalogue System, Catalogue Subgroup Issue 2.1
None	Goddard Space Flight Center, Earth Observing System Mission Operations Concept Document
None	Operations Interface Control Document, Earth Observing System AM Spacecraft to Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER)

This page intentionally left blank.

3. Interface Overview

3.1 Interface Context

The ECS and the ASTER GDS work together to provide ground support for mission operations and science data processing for the ASTER instrument onboard the EOS AM-1 spacecraft. This support includes spacecraft and instrument mission operations (planning, scheduling, control, monitoring, and analysis), science data processing (data processing, distribution, and archival), and ground system communications and management. In addition, the ASTER GDS will be interoperable with ECS so that an EOSDIS user or ASTER GDS user will be able to view the data holdings and order production data of the other system.

Figure 3-1 presents a high level context diagram for the ECS/ASTER GDS interfaces. Note that the user interfaces for Data Search and Request and Data Product delivery in this diagram depict only the interfaces related to ECS/ASTER GDS data interoperability.

3.2 Pre-Mission Phase Interfaces

Some of the ECS-ASTER GDS interfaces described in this ICD occur during the pre-mission phase. These interfaces are primarily concerned with setup and configuration of the ground system data bases and interfaces prior to use in mission operations.

3.2.1 AOS-FOS Pre-Mission Phase Interfaces

For AOS-FOS interfaces, pre-mission interfaces begin after the delivery of the ECS IST software by NASA to ERSDAC, and subsequent installation of this software on an ASTER Operations Segment (AOS) host computer at the ASTER ICC. After the ICC is operational, the ASTER Instrument Operations Team (IOT) at the ASTER ICC uses the ECS IST interface to the EOC to submit ASTER Data Base Updates for Activity Definitions, Activity Constraint Definitions, Relative Time Command Sequences (RTCSs), and Command Procedures. These interfaces are described in Section 5 of this ICD. (Note that the ASTER instrument team delivers command and telemetry data base definitions directly to the AM-1 spacecraft vendor for pre-mission check-out. During the pre-mission phase, FOS will obtain this ASTER command and data base information from the AM-1 spacecraft vendor. The FOS will provide pre-mission PDB files to the AOS for verification prior to mission operations.)

3.3 Mission Phase Interface

Most of the ECS-ASTER GDS interfaces described in this ICD occur during the mission phase. These interfaces are concerned with day-to-day mission and science operations within ECS and ASTER GDS. Note that the interfaces concerned with setup and configuration of the ground configuration updates may occur throughout the lifetime of the AM-1 mission.

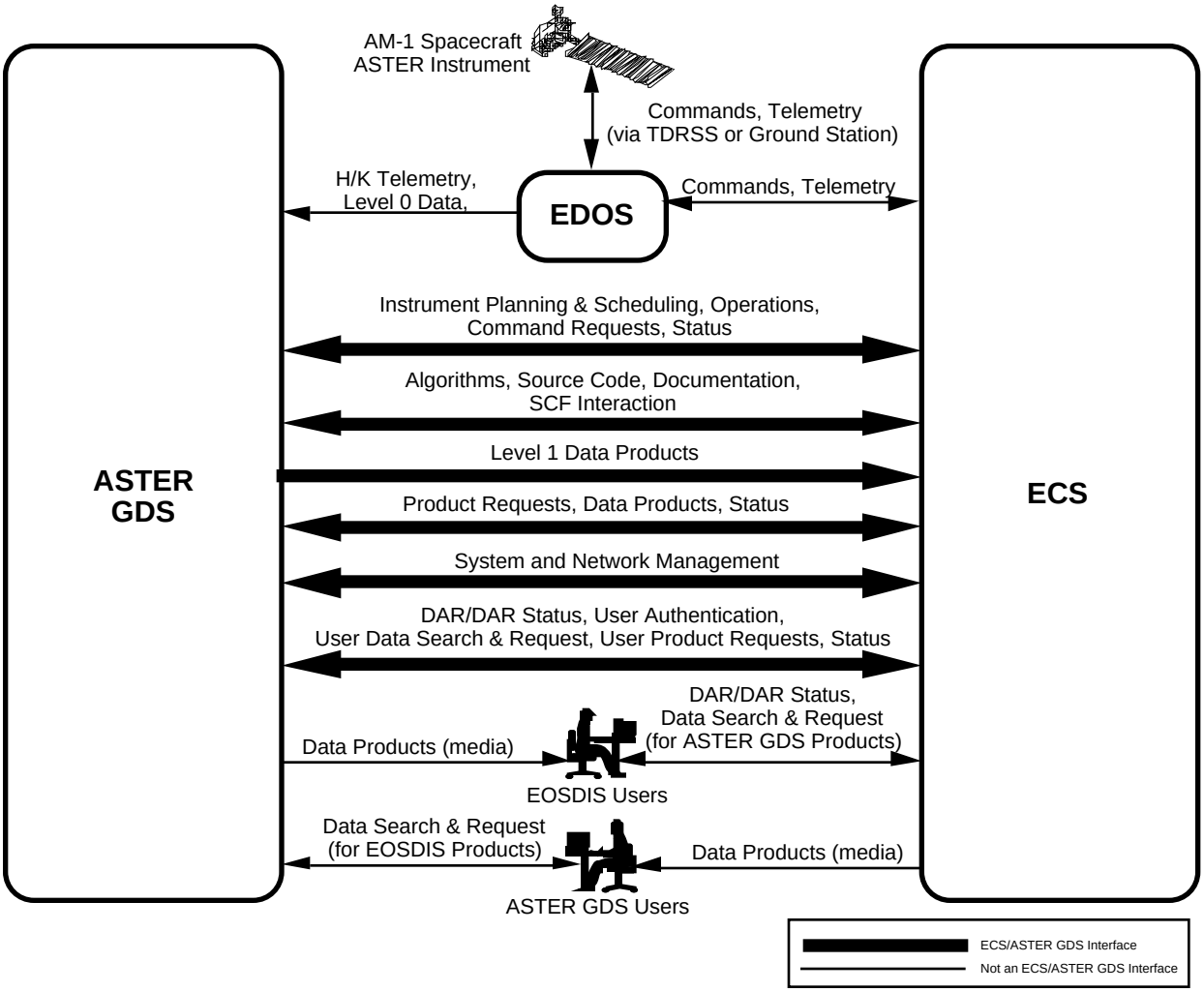

Figure 3-1. ECS/ASTER GDS Context Diagram

3.3.1 AOS-FOS Mission Phase Interfaces

AOS-FOS mission phase interfaces are described in Section 5 of this ICD.

As during the pre-mission phase, the AOT may submit ASTER Data Base Updates for Activity Definitions, Activity Constraint Definitions, Relative Time Command Sequences (RTCS), and Command Procedures. Updated ASTER command and telemetry definitions also may be submitted to FOS using the ECS IST interface. FOS will make the approved command and telemetry definitions for the AM-1 spacecraft and ASTER available to the AOS. The ASTER AOS may access EOC Project Data Base (PDB) either via the ECS IST interface (displays, reports) or via PDB text files that may be transmitted from the ECS IST to an ASTER AOS host. Procedures for coordination of PDB updates will be defined in the Operations ICD EOS AM Spacecraft to ASTER.

Mission phase interfaces include the exchange of planning and scheduling products for the ASTER instrument and the AM-1 spacecraft. The products exchanged include ASTER Short Term Schedules (STS), ASTER One Day Schedules (ODS), Preliminary Resource Schedules, Activity Schedules, Detailed Activity Schedules, Requests for EOC Schedules, and Planning Aids.

The ASTER Instrument Operations Team (IOT) also may use the ECS IST to access Absolute Time Command (ATC) Load Reports and Integrated Reports from FOS. These reports provide insight into the AM-1 stored command load and upcoming activities and commands that are planned for AM-1 operations.

The ASTER Instrument Operations Team (IOT) and the EOC Flight Operations Team (FOT) exchange products including Real Time Command Requests (submitted by the ASTER IOT to the EOC FOT) and instrument, spacecraft, and overall AM-1 mission status reports.

During the real time contact, FOS generates instrument real-time command notifications and instrument command uplink status (via event messages) whenever the EOC issues a real real time and historical event messages time ASTER command to the AM-1 spacecraft. The IOT may use the ECS IST capabilities to access real time and historical event messages.

This page intentionally left blank.

4. Data Exchange Framework

4.1 Overview

Section 4 defines the data exchange framework for the network interfaces, message flows, and file transfers between ECS and the ASTER GDS. Section 4.2 describes the network topology. Section 4.3 describes the internetworking protocol standards that are used for data and information exchange. Section 4.4 addresses interface security. Sections 4.5 through 4.9 identify the protocols and handshaking control messages exchanged between ECS and ASTER GDS to accomplish the required data exchanges.

4.2 Physical Network Topology

In the U.S., the EOSDIS Backbone Network (EBnet) supports all network-communications between EOSDIS and the ASTER GDS.

In Japan, the ASTER Data Network (ADN) supports all network communications between EOSDIS and the ASTER GDS.

EBnet will develop the following ICDs to describe the details of the EBnet interfaces with ECS and ASTER GDS:

a. ICD Between EBnet and the EOS Operations Center (EOC)

b. ICD Between EBnet and the EOSDIS Distributed Active Archive Centers (DAACs)

c. ICD Between EBnet and the ASTER Ground Data System

EBnet and the ADN will each connect to a trans-Pacific link to provide connectivity for network communications between EOSDIS and the ASTER GDS. The ICD Between EBnet and the ASTER GDS will describe the EBnet interface to the trans-Pacific link. Internal ASTER GDS design documentation will describe the ADN interface to the trans-Pacific link. Operation and maintenance responsibility for the trans-Pacific link will be mutually agreed between the U.S. and Japan.

The ECS CSMS and DAAC Design Specifications describe the topology of ECS local networks (e.g., refer to Section 2.2 for a complete listing of ECS design specifications). The ICD Between EBnet and the EOC, and the ICD Between EBnet and EOSDIS DAACs will define EBnet's connectivity with the ECS.

A high-level network topology diagram for ECS-ASTER GDS mission critical communications is shown in Figure 4-1.

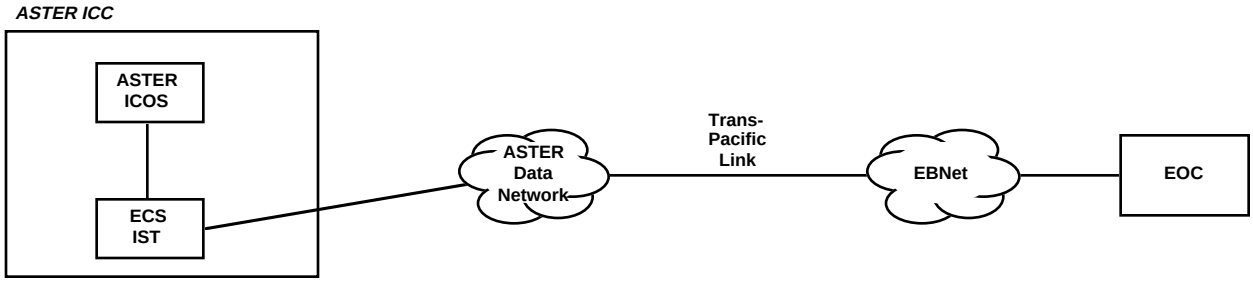

Figure 4-1. High Level Network Topology for Mission Critical Communications

4.3 Internetworking Protocols

Internetworking protocols supporting ECS-ASTER GDS data exchange are based on protocols and standards corresponding to the Open Systems Interconnection (OSI) reference model. These specifications are published in the International Organization for Standardization, Basic Reference Model of Systems Interconnection (Reference ISO 7498). These layered protocols also are described in "Internet Programming; Jamsa Press, 1995."

4.3.1 Internet Protocol (IP)

The Internet Protocol (IP), specified in RFC791, supports network layer data exchanges between ECS and the ASTER GDS. The network layer provides transparent transfer of data between transport entities. The IP addresses for ECS and ASTER GDS network nodes and workstations are determined at the time of installation.

4.3.2 Transmission Control Protocol (TCP)

Transmission Control Protocol (TCP) provides connection-oriented transport services between host computers. TCP, specified in RFC793, is a reliable end-to-end protocol designed to fit into a layered hierarchy of protocols which support multi-network applications. TCP provides for guaranteed delivery of data between host computers, as opposed to User Data Protocol (UDP), which is a connectionless-oriented transport service with no guaranteed delivery.

4.3.3 File Transfer Protocol (FTP)

File transfers between the ECS IST and ASTER GDS host computers are accomplished through the use of standard File Transfer Protocol (FTP).

EDS file transfer between GSFC DAAC in ECS and ADN in ASTER GDS CSMS is accomplished through the use of standard FTP.

Standard FTP services are described in RFC959.

4.3.4 Simple Mail Transfer Protocol (SMTP)

The protocol for e-mail transfer is the Simple Mail Transfer Protocol (SMTP). SMTP is described in RFC821. E-mail message formats are defined in RFC822.

4.3.5 Network News Transfer Protocol (NNTP)

ECS bulletin board services use the Network News Transfer Protocol (NNTP) for sending and receiving messages. ECS bulletin board services are a standard Internet application where messages are directed to all readers of a named group. NNTP is defined in RFC977.

4.4 Distributed Computing Environment (DCE) and Security

Network communications between ECS and the ASTER GDS will be accomplished via the EBnet. Neither ASTER GDS nor its host computers will provide external access to EOSDIS. EBnet, ECS, and the ASTER Data Network (ADN) will provide the packet filtering function. In addition, ECS also will perform port filtering. The detailed implementation is described in the EBnet ICD. End-to-end hosts will implement the respective security method as follows:

A standardized processing environment, Open System Foundation's (OSF) Distributed Computing Environment (DCE) services, will be used to maintain the security of the interfaces between ECS and ASTER GDS. DCE Security Services make use of configuration-controlled Access Control Lists (ACLs) and Kerberos authentication tools to maintain security for communications between ECS and ASTER GDS. ECS and ASTER GDS will use OSF DCE Version 1.1.

The ECS IST will host DCE client host software and will be configured as part of the EOC cell.

The ASTER GDS will host a copy of the ECS IST toolkit software on an ASTER GDS-provided workstation at the ASTER Instrument Control Center (ICC). Some data exchanges between the ASTER ICC and the EOC will be accomplished through the use of the ASTER ICC's ECS IST. The use of DCE and Kerberos security services in the EOC and the ASTER ICC's ECS IST toolkit supports reliable user authentication and ensures the security of the mission critical interfaces between the ECS EOC and the ASTER ICC.

DCE security services are not used for data transferred using e-mail services.

4.5 Data Exchange Between the ECS FOS and the ASTER GDS AOS

Some electronic data exchange between the ECS FOS and the ASTER GDS AOS will be accomplished through an ECS IST Toolkit hosted on an ASTER GDS-provided workstation at the ASTER ICC. The handshaking and higher level communications protocols for transferring data between the EOC and the ASTER ICC's ECS IST Toolkit are documented in ECS FOS design specifications (refer to Section 2.2 for a complete listing of applicable FOS design specifications). Network connectivity between the ASTER ICC's ECS IST and the EOC will be accomplished via mission-critical communications (EBnet) circuits.

4.5.1 Automated File Transfers Between ECS IST and ASTER AOS

4.5.1.1 Messages Exchanged via Automated FTP

Planning and scheduling messages and planning aids files are transferred between the ECS IST and the ASTER GDS AOS via automated FTP over the ASTER ICC LAN. (Refer to Figure 4-2.)

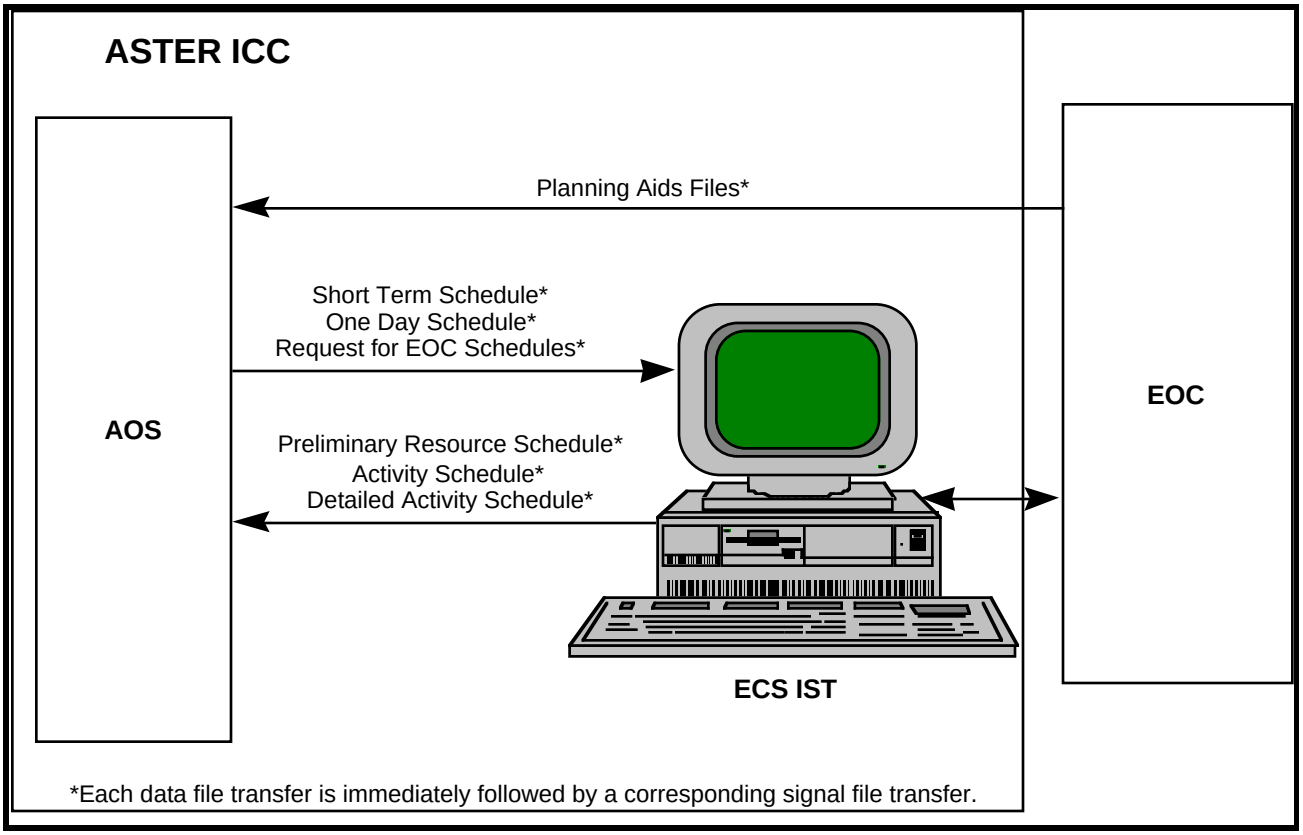

Figure 4-2. Data Files Transferred via Automated FTP

The FOS automatically FTPs planning aid files (as defined in Section 5) to the ASTER AOS whenever new planning aid files are received from FDF and successfully ingested into the FOS.

The ASTER AOS sends STSs and ODSs to the ECS IST; these files are automatically ingested and processed by the FOS. The FOS automatically sends a Preliminary Resource Schedule file to the ASTER AOS in response to every STS received. This Preliminary Resource Schedule file covers the same time frame as the corresponding STS. Likewise, the FOS automatically sends an Activity Schedule file to the ASTER AOS in response to every ODS received. This Activity Schedule file covers the same time frame as the corresponding ODS.

The ASTER ICC may obtain the most recent versions of EOC schedules by sending a Request for EOC Schedules file to the ECS IST. The Request for EOC Schedules file results in the automatic delivery of an Activity Schedule file to the ASTER AOS. This Activity Schedule file covers the time frame requested in the Request for EOC Schedules file. The ASTER AOS may send a Request for EOC Schedules file to the ECS IST at any time during the scheduling process.

FOS automatically delivers Detailed Activity Schedule files to the ASTER AOS whenever these products are generated or updated by the FOS.

4.5.1.2 Message Sequence for Automated FTP

A generic message sequence applies for all automated FTP transfers between the FOS and the ASTER AOS. In this transfer sequence, the sender of the data initiates the communications session with the receiver. Using standard FTP, the sender transfers the data file to a specified directory on the receiving host computer. Immediately upon completion of the FTP of the data file, the sender sends a 'signal file' to the same directory on the receiving host computer.

The 'signal file' is used by the receiving host to identify the completion of the file transfer of the data file. The file name of the 'signal file' will be the same as the file name of the data file, except that the 'signal file' will have the additional extension field of "XFR". For example, if the ASTER AOS sends a data file named "ASTER_STS_1999028001.txt", the corresponding 'signal file' is named "ASTER_STS_1999028001.txt.XFR". Similarly, if the ECS IST sends a data file named "EOC_PRS_1999028003.txt", the corresponding 'signal file' is named "EOC_PRS_1999028003.txt.XFR".

4.5.2 Interfaces Supported by Operator Interaction with the ECS IST

Through use of the ECS IST's user interface, the ASTER IOT will have access to other FOS tools and capabilities for submitting PDB updates for ASTER (e.g., command, telemetry, activity, and constraint definitions), building command procedures, relative time command sequences, and real time command requests. These products are submitted to the FOS through the ECS IST user interface. (Refer to Figure 4-3.)

The ASTER AOS may access EOC Project Data Base (PDB) files either via the ECS IST interface (displays, reports) or via PDB text files that may be transmitted (by operator-initiated FTP) from the ECS IST to an ASTER AOS host.

(Note: Files transferred via operator-initiated FTP do not use the special message sequencing protocol that is used for automated FTP (i.e., 'signal files' are not used).)

The IOT and other AOS host operators also will have access to ECS IST displays and EOC reports through the ECS IST user interface. This allows the ASTER IOT to use the ECS IST to access to EOC event messages for command notification and command load reports.

The ECS IST user interface also may be used by the IOT and other AOS operators to view EOC plans and schedules and to access FOS tools for requesting and viewing the results of command-level constraint analyses performed on 'what-if' analysis schedules by the FOS Command Management Subsystem.

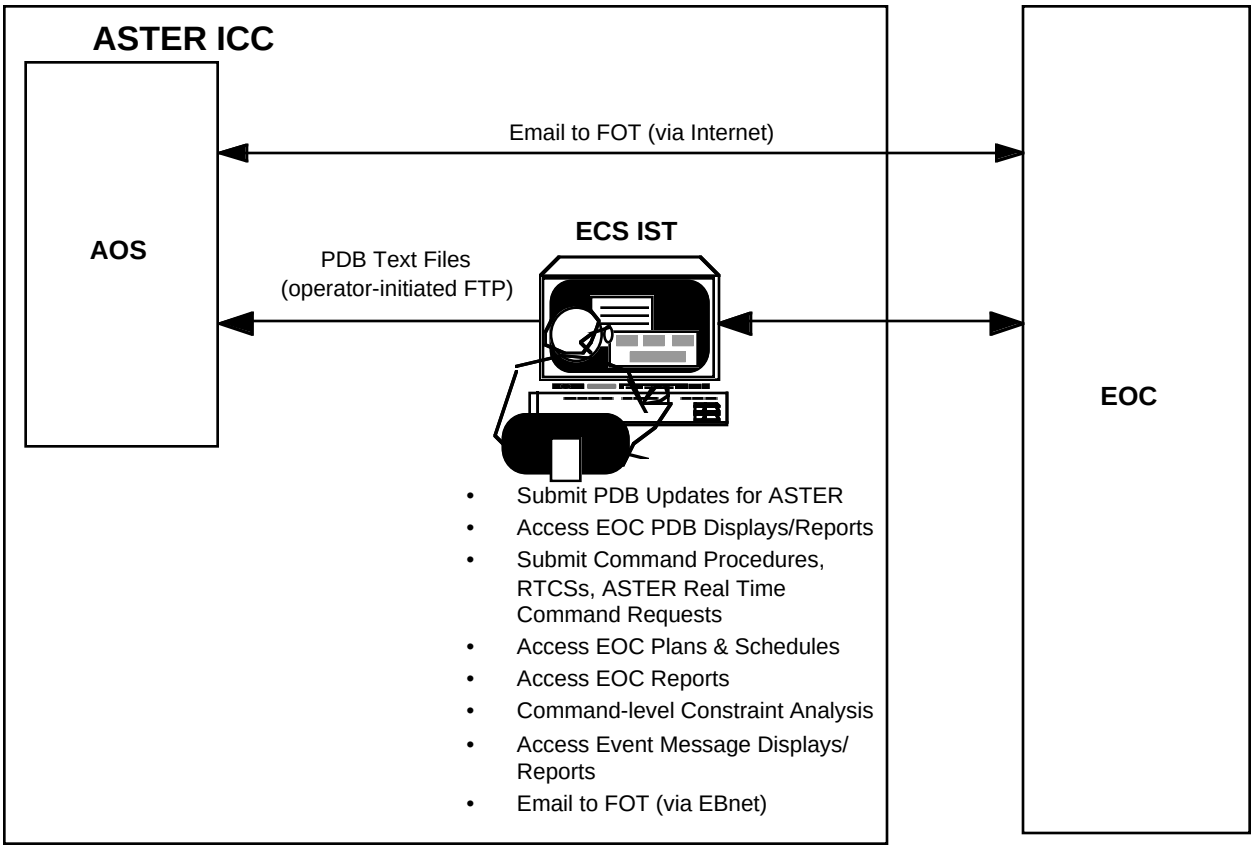

Figure 4-3. ECS IST Operator Interfaces

Details of the ECS IST user interface will be documented in the FOS Operations Manual for the ECS Project.

4.5.3 Email Exchange Between the ASTER ICC and the EOC

Operations status reports and inter-instrument coordination messages are exchanged between the ASTER IOT and the FOT via email. Two paths exist for the exchange of email between the ASTER ICC and the EOC. (Refer to Figure 4-3).

The ASTER IOT may use the ECS IST to exchange email (over EBnet circuits) with the FOT at the EOC. In this case, the email exchange is between the ASTER ICC's ECS IST and the FOT's EOC User Stations.

Optionally, the ASTER IOT use email services provided on an ASTER AOS host to exchange mail with the FOT via the Internet. In this case, the email exchange is between an ASTER AOS host computer and the FOT's off-line computers in the EOC.

Policies for email exchange will be documented in the Operations ICD EOS AM Spacecraft to ASTER.

4.6 Data Exchange Between the ECS SDPS and the ASTER GDS SDPS

4.6.1 ASTER Gateway: Information Manager

The interface between the ECS and the ASTER GDS Information Management Subsystem (IMS), via the ASTER Gateway IM, supports two-way catalog interoperability to provide an exchange of data and information. Specifically, this interface supports the search, location and acquisition of data between ECS and the ASTER GDS IMS, providing ECS and ASTER GDS IMS users with ready access to the data and services provided by the other system. Figure 4-5 displays a high level context diagram for the catalog interoperability interfaces between ECS and the ASTER GDS. The specific catalog interoperability interfaces supported via the ASTER Gateway include the following:

a. directory search request/results - for finding data sets.

b. inventory search request/results - for locating specific granules within a dataset.

c. acknowledge - to acknowledge reception of inventory search results chunk.

d. browse requests/responses - for enabling the user to retrieve/view “representative images, as well as non-image data.

e. product requests/results - placement of orders for full resolution data sets.

f. quit - notification of premature termination of a session due to problems; also used at the normal termination of inventory results exchanges of chucks.

g. price estimate request/result - confirmation of price prior to product request.

h. product status request/information - confirmation of product processing status.

i. product Cancel request/response - cancellation by users.

The interface between the ASTER GDS IMS, and ECS, via the ASTER Gateway, uses Object Description Language (ODL) to implement the messages shown in Figure 4-4.

a. The ASTER Gateway translates the ASTER GDS user’s ODL service request into Object Oriented Distributed Computing Environment (OODCE); in addition, Illustra’s version of SQL is used as the Earth Science Query Language (ESQL) for ECS.

b. Using OODCE/SQL, the ECS interfaces via the ASTER Gateway to the ASTER SDPS. To accommodate the interface to the ASTER SDPS, the ASTER Gateway first translates the ECS user’s service request into ODL.

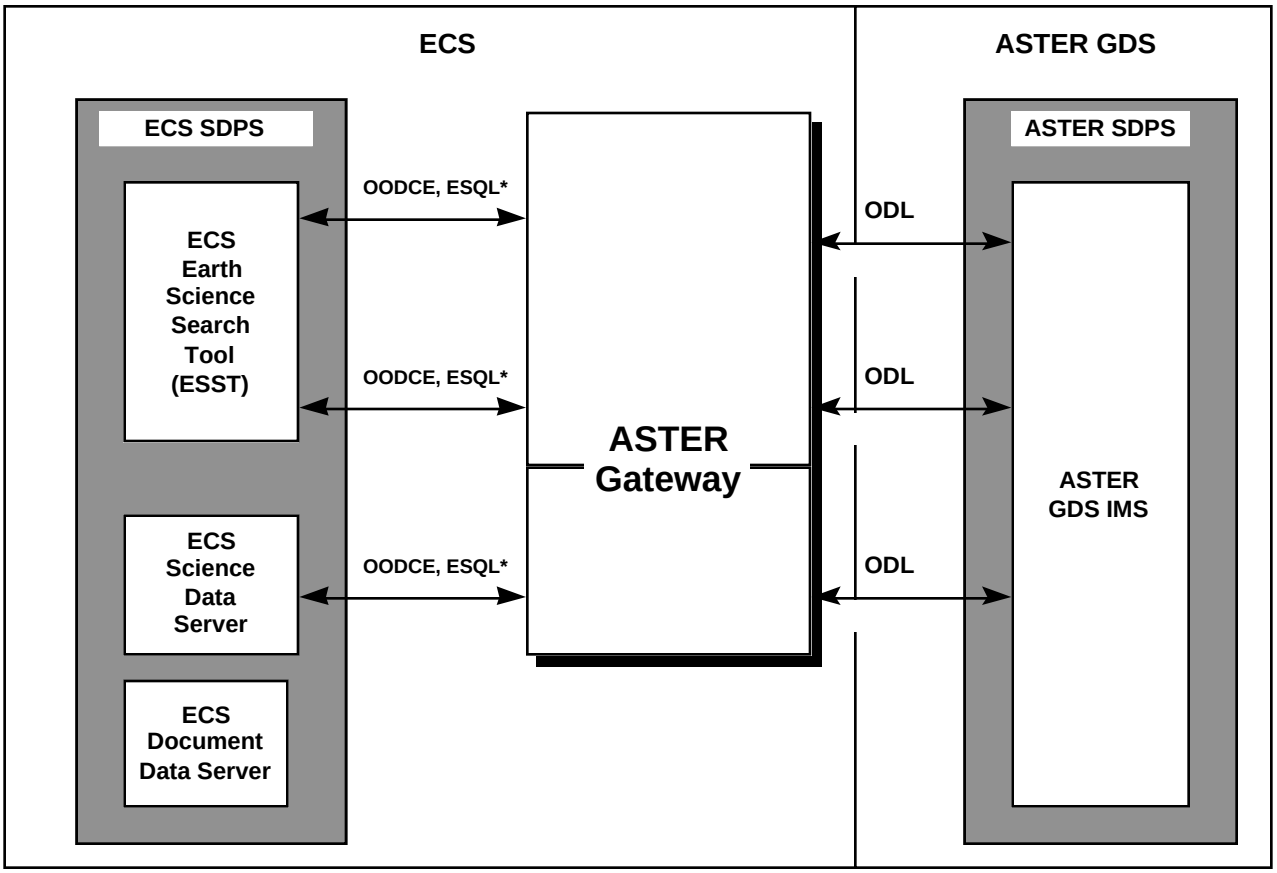

Figure 4-4. ECS/ASTER GDS IMS Interoperability via ASTER Gateway: Context Diagram

4.6.1.1 ASTER Gateway: DAR Communications Gateway

The ASTER Communications Gateway is the software that is used to support all communications infrastructure necessary for two-way protocol conversion between TCP/IP sockets and DCE RPC to accommodate communications between the ASTER GDS DAR Server and the ECS DAR Tool (part of Client Subsystem).

4.6.1.2 ASTER Gateway: Management Subsystem

The ASTER Gateway Management Subsystem (MSS) includes the management support functions needed within the ASTER Gateway to support the ECS-ASTER GDS IMS interfaces.

4.6.2 Data Acquisition Requests (DARs)

Data exchange between the ASTER GDS SDPS and the ECS SDPS for DARs will be accomplished via Application Programming Interfaces (APIs) to a DAR Client application which is integrated into the ECS SDPS Client. This DAR Client application will be developed by the ASTER GDS and provided to NASA for use in the ECS SDPS Client. The APIs provide the interface between the DAR Gateway and ASTER IMS DAR Server. The DAR Client API List is provided as Appendix C to this document.

The communications layer application between the DAR Client Application and the ASTER GDS DAR Server will consist of the ASTER GDS DAR Server communicating with the ASTER Gateway using existing protocol; the ASTER Gateway communicates via RPCs to ECS DAR clients.

Network connectivity for communications between the ECS and the ASTER GDS for DAR communications will be accomplished via EBnet circuits. **Note:** All DAR network traffic passes through an EBnet router in GSFC Building 32.

4.6.3 Delivery of ASTER Level 1A and Level 1B Products

The ASTER GDS will store Level 1A and Level 1B products on separate tapes. A total of three tapes will be shipped to EDC on a daily basis.

4.6.3.1 Level 1A Product File

ASTER Level 1A Product File Format is defined in the ASTER Level 1 Data Products Specification (GDS Version). Products will be shipped to EDC in the form of D3 tapes without any additional processing. Contents of Level 1A Product file are as follows:

a. Browse of ASTER L1 Product shall be created only when ASTER L1 Product is created.

b. The Product File and a Browse File will be produced for each scene.

c. The Product File will contain image data, ancillary data, supplement data, Generic Header, and a Specific Header.

4.6.3.2 Level 1B Product File

ASTER Level 1B Product File Format is defined in the ASTER Level 1 Data Products Specification (GDS Version). Products will be shipped to EDC in the form of D3 tapes without any additional processing. Contents of Level 1B Product file are as follows:

a. Browse data shall not be created when L1B product is created.

b. The Product File will be produced for each scene.

c. The Product File will contain Generic Header, and Specific Header.

Table 4-1 summarizes the contents of ASTER Level 1A and 1B Products for delivery.

Table 4-1. Level 1 Products

Product Category	Product
L1A	L1A products scheduled using L0 data as the source.
	Re-processed L1A Products
L1B	L1B products scheduled using L1A products which have been created on the previous production unit.
	L1B products scheduled in response to DPRs using existing L1A products.
	Re-processed L1B products

4.6.3.3 Data Shipping Notice

Prior to a delivery of ASTER Level 1A and 1B Products to EDC, ASTER GDS will e-mail a Data Shipping Notice to the EDC DAAC when the tapes for delivery have been completed.

4.6.3.4 D3 Tape Delivery

ASTER GDS will create a total of three D3 tapes daily. The total data stored on all three tapes will not exceed 158 GB (This is the uncompressed size). Since tapes may not be shipped by ASTER daily, ECS may receive none, or more than three tapes on any given day. The ASTER Level 1 Product Structure in D3 Tape is shown in Figure 4-5.

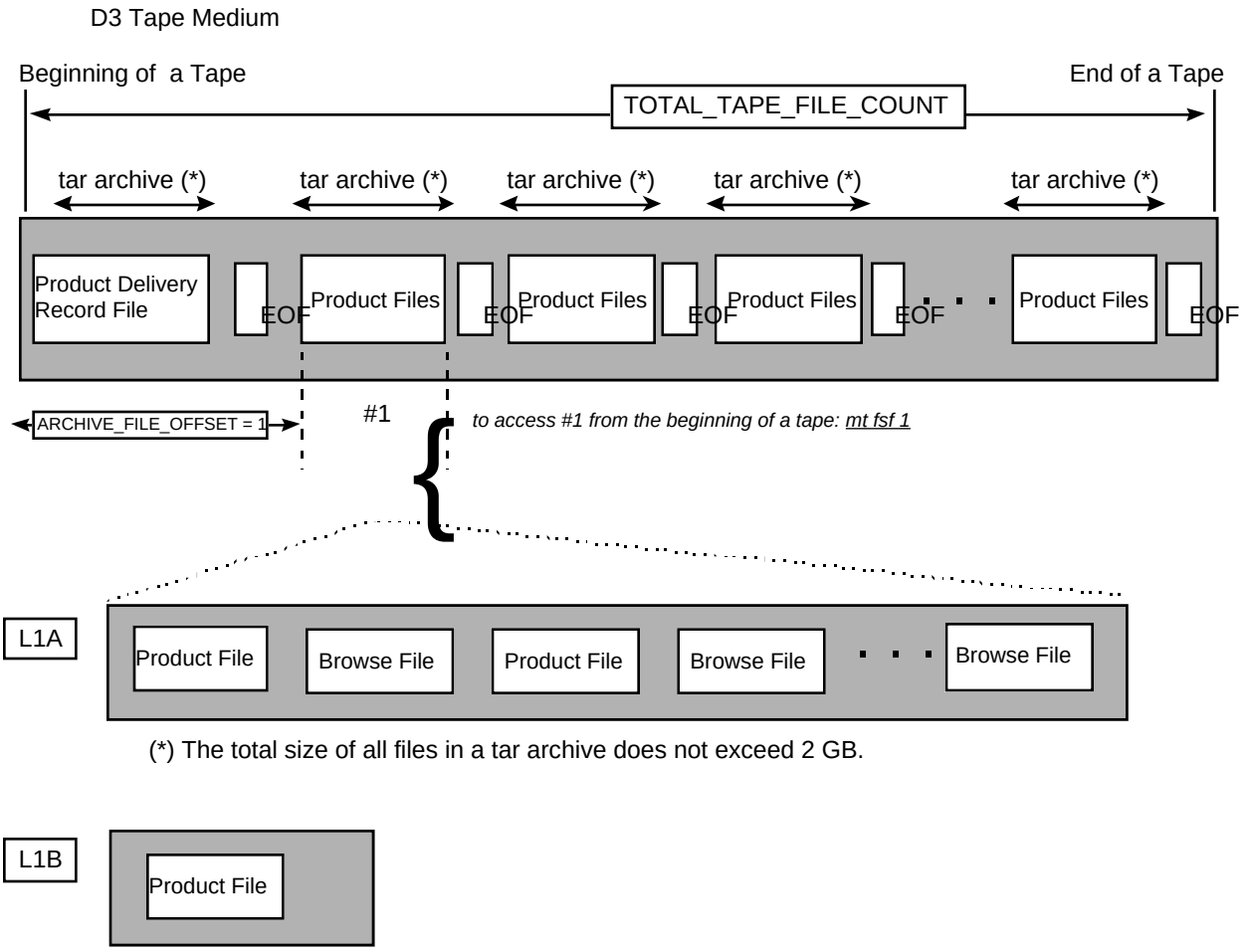

Figure 4-5. ASTER Level 1 Product Structure in D3 Tape

4.6.3.4.1 D3 Tape Storing Rules

The following storing rules apply to all ASTER Level 1A and Level 1B products delivered by the ASTER GDS to EDC on D3 tapes:

a. Files will be stored into D3 tapes by use of the UNIX tar command. The UNIX tar command will not use absolute path. To unpack all files in a TAR file, the following UNIX command can be used: mt fsf <archive file offset> + TAR xf <device> *

b. Files in D3 tape will be stored without any file directories.

c. The TAR archival unit for L1A Products will be the same as the processing unit of the PGS, which is a strip unit of observation. The archival unit for ECS is a Product FileIBrowse file pair. The Product File is for a scene of data.

d. The Product Delivery Record will contain the number of archives and the number of EOF skips for each file. Product Delivery Record will be contained in the first archive of the tape. The first archive will contain only the Product Delivery Record File.

e. Files will be stored on the D3 tape in chronological order within an archive. The storage order between tar archives can be of any order.

f. Level 1A and 1B Products will be stored on separate media.

g. D3 Tapes are always compressed by hardware.

h. All L1 re-processed products in a production unit (1 day) will be shipped.

4.6.3.5 Physical Media Format

4.6.3.5.1 Product Delivery Record File

The format of the Physical Media Product Delivery Record (PDR) is shown in Table 4-2.

The structure of Physical Media Product Delivery Record (PDR) is shown in Figure 4-7. An example of a Product Delivery Record PVL is shown in Figure 4-7.

4.6.3.6 Metadata

Product-Core Metadata and Product-Specific Metadata of ASTER-Level 1A and 1B products are defined in the ASTER Level 1 Data Product Specification (GDS Version). Each Metadata will be stored in the Product File. In addition to the Metadata in the Product File, XAR information (XAR ID, XAR Type) will be stored in the Product Delivery Record as described in Table 4-2.

4.6.3.7 Browse

Browse data of the ASTER-Level 1A and 1B products will be defined in the ASTER Level 1 Data Products Specification (GDS Version). Browse of Level 1 Product shall be created only when L1A product is created. Browse of L1B shall not be created.

Table 4-2. Format of Product Delivery Record

Parameter	Contents	PVL Data Type	Max Length (Bytes)t	Value
ORIGINATING_ SYSTEM	PDR originator	ASCII	20	Identifier of the processing facility in the ASTER GDS.
TOTAL_TAPE_FILE_ COUNT	The total number of TAR files included in the shipped tapes.	Integer ASCII	4	1-9999
TOTAL_FILE_COUNT	Total number of ProductIBrowseFiles	ASCII	4	1-9999
OBJECT	Start of ProductIBrowse File Pair Definition	ASCII	10	FILE_GROUP*
ARCHIVE_FILE_ OFFSET	Offset to the tar archive file which contains the target file (i.e., the number of EOFs to be skipped).	Integer ASCII	4	1-9999
DATA_TYPE	Data type. Registered ESDT short name for data.	ASCII	20	AST_L1A, AST_L1B
	Start of File Parameters. Repeat for each File in the ProductIBrowse File Pair	ASCII	9	'FILE_SPEC'
DIRECTORY_ID	Directory name for any sub-directories in TAR File	ASCII	256	Directory ID parameter is omitted since TAR File on D3 tape does not have sub-directories.
FILE_ID	File name follows ASTER GDS File Naming convention.	ASCII	256	The File ID of a ProductIBrowse File
FILE_TYPE	File data type.	ASCII	20	Science, Browse
FILE_SIZE	File size in Byte	ASCII Unsigned 32bit Integer	10	$<4.295 * 10^{9}$
END_OBJECT	End of parameters for each file.		9	FILE_SPEC
OBJECT	Start of XAR Info Entry.	ASCII	9	XAR_ENTRY
GRANULE_ID**	Granule ID defined by ASTER GDS	ASCII	29	PVL string
XAR_INFO_COUNT	Number of XAR Information Objects	ASCII	10	0-1100 PVL integer
OBJECT	Beginning of XAR Information, repeat for XAR_INFO_COUNT	ASCII	8	'XAR_INFO'
XAR_ID	XAR_ID	ASCII	10	Pvl integer
XAR_TYPE	XAR_TYPE	ASCII	8	PVL string
END_OBJECT	End of XAR Information	ASCII	9	XAR_INFO
END_OBJECT	End of XAR Information Entry	ASCII	9	XAR_ENTRY
END_OBJECT	End of parameters for each file group			'FILE_GROUP'

Legend:

* A File Group represents an ECS Granule. (A Granule is the smallest aggregation of data that can be inventoried with ECS and ordered from ECS). An ASTER Granule is a single Product File.

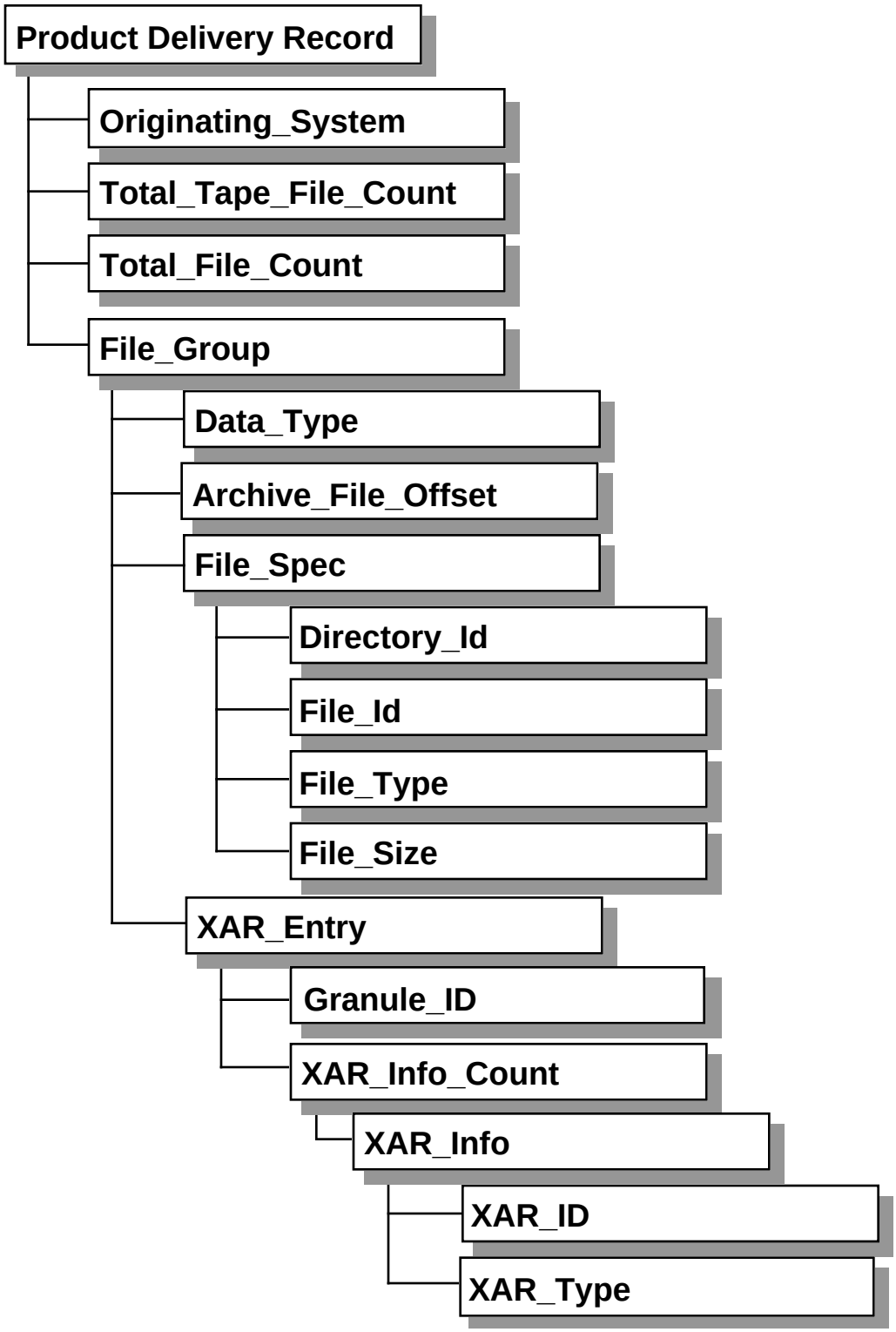

Figure 4-6. Structure of Physical Media PDR (level 1 cassette)

```
        ORIGINATING_SYSTEM = ASTERGDS;
        TOTAL_TAPE_FILE_COUNT = 3;
        TOTAL_FILE_COUNT = 9;
        OBJECT = FILE_GROUP;
                DATA_TYPE = AST_L1A, AST_L1B
                ARCHIVE_FILE_OFFSET = 2;
                OBJECT = FILE_SPEC:
                        FILE_ID = <aster HDF EOS file name>;
                        FILE_TYPE = SCIENCE;
                        FILE_SIZE = 242120;
                END_OBJECT = FILE_SPEC;
                OBJECT = FILE_SPEC:
                        FILE_ID = <aster browse file name>;
                        FILE_TYPE = BROWSE;
                        FILE_SIZE = 2098;
                END_OBJECT = FILE_SPEC;
OBJECT = XAR_ENTRY;
                        GRANULE_ID = <aster xar granule id>;
                        XAR_INFO_COUNT = 2
                        OBJECT = XAR_INFO;
                                XAR_ID = <aster xar id>;
                                XAR_TYPE =
                        OBJECT = XAR_INFO;
                                XAR_ID = <aster xar id>;
                                XAR_TYPE =
                        END_OBJECT = XAR_INFO;
                END_OBJECT = XAR_ENTRY;
        END_OBJECT = FILE_GROUP;
OBJECT = FILE_GROUP;
                DATA_TYPE = AST_L1A, AST_L1B

                ARCHIVE_FILE_OFFSET = 2;
                OBJECT = FILE_SPEC:
                        FILE_ID = <aster HDF EOS file name>;
                        FILE_TYPE = SCIENCE;
                        FILE_SIZE = 242120;
                END_OBJECT = FILE_SPEC;
```

Figure 4-7. Sample Product Delivery Record PVL (1 of 3)

```
                    OBJECT = FILE_SPEC:
                              FILE_ID = <aster browse file name>;
                              FILE_TYPE = BROWSE;
                              FILE_SIZE = 2098;
                    END_OBJECT = FILE_SPEC;
                    OBJECT = XAR_ENTRY;
                              GRANULE_ID = <aster xar granule id>;
                              XAR_INFO_COUNT = <aster xar id>;
                              OBJECT = XAR_INFO;
                                        XAR_ID = <aster xar id>;
                                        XAR_TYPE = <aster xar type>;
                              END_OBJECT = XAR_INFO;
                    END_OBJECT = XAR_ENTRY;
          END_OBJECT = FILE_GROUP;
OBJECT = FILE_GROUP;
                    DATA_TYPE = AST_L1A, AST_L1B
                    ARCHIVE_FILE_OFFSET = 3;
                    OBJECT = FILE_SPEC:
                              FILE_ID = <aster HDF file name>;
                              FILE_TYPE = SCIENCE;
                              FILE_SIZE = 2589510;
                    END_OBJECT = FILE_SPEC;
                    OBJECT = FILE_SPEC:
                              FILE_ID = <aster browse File name>;
                              FILE_TYPE = BROWSE
                              FILE_SIZE = 3020;
                    END_OBJECT = FILE_SPEC;
                    OBJECT = XAR_ENTRY;
                              GRANULE_ID = <aster granule id>;
                              XAR_INFO_COUNT = 1
                              OBJECT = XAR_INFO;
                                        XAR_ID = <aster xar id >;
                                        XAR_TYPE = <aster xar type>;
                              END_OBJECT = XAR_INFO;
                    END_OBJECT = XAR_ENTRY;
          END_OBJECT = FILE_GROUP;
```

Figure 4-7. Sample Product Delivery Record PVL (2 of 3)

```
OBJECT=FILE_GROUP;
        DATA_TYPE=ASTL1B
        ARCHIVE_FILE_OFFSET=1;
        OBJECT = FILE_SPEC;
        DIRECTORY_ID = “NOT USED”;
        FILE_ID = <aster HDF file name>;
        FILE_TYPE = SCIENCE;
        FILE_SIZE = 242120;
END_OBJECT = FILE_SPEC
OBJECT = XAR_ENTRY;
        GRANULE_ID = “...”;
        XAR_INFO_COUNT = 9999;
        OBJECT = XAR_INFO;
                XAR_ID = <integer>;
                XAR_TYPE = <char(8)>;
        END_OBJECT = XAR_INFO;
END_OBJECT = XAR_ENTRY;
OBJECT = FILE_SPEC;
        DIRECTORY_ID = “NOT_USED”;
        FILE_ID = <aster HDF file name>;
        FILE_TYPE = SCIENCE;
        FILE_SIZE = 242120;
END_OBJECT = FILE_SPEC;
...
```

Figure 4-7. Sample PDR (L1B Product Tape Without Browse File) (3 of 3)

4.6.3.8 Data Shipping Notice

Prior to a delivery of ASTER Level 1A and 1B Products to EDC, ASTER GDS SDPS DADS will send a Data Shipping Notice by e-mail, via EBnet to the EDC DAAC when the tapes for delivery have been completed. The ASTER GDS SDPS DADS will transmit the Data Shipping Notices by e-mail, via Ebnet to the ECS DAAC Operations Supervisor at EDC. In the event that an expected Data Shipping Notice is not received, the DAAC Operations Supervisor at EDC will inform the ASTER GDS SDPS DADS Operations Supervisor by telephone.

The structure and format of Data Shipping Notice to be used at DADS are depicted in Figure 4-8 and Table 4-3. Figure 4-9 contains the standard E-mail Header to be used.

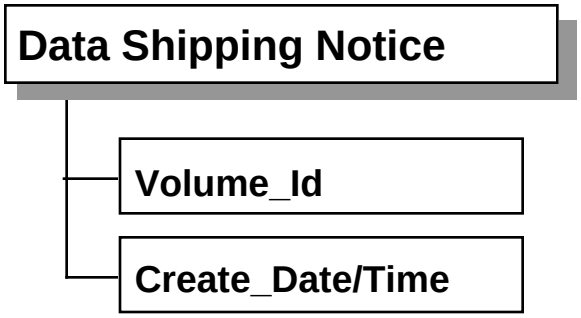

Figure 4-8. Structure of Data Shipping Notice

Table 4-3. Format of Data Shipping Notice

Parameter	Data Type	Byte	Content
VOLUME_ID	ASCII	-	Bar Code Follows ASTER standard Table 4-5
CREATE_DATE/TIME	ASCII	20	Date (GMT) Date/Time when tape generation began; yyyy-mm-ddThh:mm:ssZ, where T indicates start of time information and Z indicates “Zulu” time.

```
E-mail Contents Header
BEGIN_OBJECT=GDS_Header;          /* Message Sequential Number  0 ~ 999999999(dec) */
Message_Number=123456789;         /* Re-entarant Check Flag  "Yes", "No" */
ReEntrantCheck=Yes;               /* Sender ID  ECS, GDS */
Sender_ID=GDS;                    /* Receiver ID  ECS, GDS */
Receiver_ID=ECS                   /* Operation Mode  "Operation", "Test" */
Mode=Operation;                   /* Data Sequential Number  0~999999999(dec) */
Data_Number=0;                    /* End-data Flag  "E" or "" */
EndData_Flag=E;                   /* User ID */
Send_Date=1998-08-01;             /* Send Date  yyyy-mm-dd */
Send_Time=06:56:12.056;           /* Send Time  hh:mm:ss.msc */
END_OBJECT=GDS_Header;
/* End of GDS Header */
```

No.	Key	Contents	Value
1	Message_Number	Message serial number in seder segment. A series of Interface sequence is set same number.	"000000000" ~"999999999"(dec) Values are used cyclically.
2	ReEntrantCheck	If this flag is "Yes", same " Message_Number" message can be skipped in Receiver.	"Yes": Check "No": No Check
3	Sender_ID	Identifier of Sender's Segment/Subsystem.	ECS, GDS
4	Receiver_ID	Identifier of Receiver's Segment/Subsystem	Same as Sender_ID
5	Mode	Identifier of Operation Mode / Test Mode.	"Operation" or "Test"
6	Data_Number	Serial Number in the case there are plural data.	"000000000" ~"999999999" (dec)
7	EndData_Flag	Identifier of End data in the case there are plural data.	ASCII Blank (20hex): all data except end one "E": Last data (including in the case of there is only 1 data)
8	Send_Date	Date to send message. Display with yyyy-mm-dd. Use **GMT**. yyyy: Year mm: Month dd: Day	yyyy:0000~9999 mm:01~12 dd:01~28,29,30,31
9	Send_Time	Time to send message. Display with hh:mm:ss.msc. Use **GMT**. hh: Hour (24hour system) mm: Minute ss: Second msc: Milli Second	hh:00~23 mm:00~59 ss:00~59 msc:000~999 Use MSCif necessary. Set 000 if not necessary.

Figure 4-9. Standard GDS E-mail Header

4.6.3.9 File Naming Convention

Naming convention of L1 Product File for delivery to EDC is shown in Table 4-4.

Table 4-4. File Naming Convention

Field	Bytes	Content	Value
Creator	2	Characters representing the file creator. Specify PGS(SDPS2) as the data creator.	"pg"
Delimiter	1		"-"
Data Type	2	Characters representing the data type (Product).	"PR"
Product Level	4	Alpha-numerics representing the Product Processing Level.	L1A and L1B
Supplemental Information	2	Alpha-numerics. Usage includes to identify the sensor.	
Delimiter	1		"-"
Sequential Number	18	Sequential number given in the product generation process.	
Production Plan ID	10		9999999999
Delimiter	1		"_"
Production Request ID	3		999
Delimiter	1		"_"
Sequential Number of Product in Production Request	3		999

4.6.3.10 Bar Code Convention

Figure 4-10 and Table 4-5 represent the bar-code format of L1 product media to be shipped to EDC.

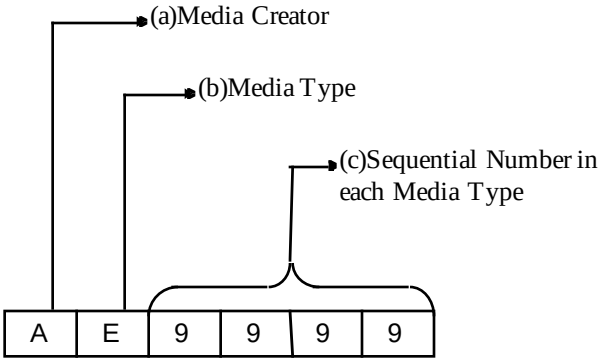

Figure 4-10. Bar Code Format used for Media for delivery to EDC

Table 4-5. Definition of Bar Code Format for Media Delivery to EDC

Field Name	Bytes	Content	Value
(a)Media Creator	1	A character representing Media Creator.	"A"=ASTER
(b)Media Type	1	An alpha-numeric representing Media Type.	"E"=For shipping 'E' in the first tape shall be changed to 'chA' in the re-transmitted tape. The bar code format for re-transmitted tapes shall be Axxxx where "xxxx" is a hexadecimal number..
(c)Sequential Number in each Media Type	4	A sequential number in each Media Type (in Hex)	0-`FFFF X' (0-65535 in decimal)

4.7 Data Exchange Between the ECS CSMS and the ASTER GDS AOS

Network communications for ECS bulletin board access will use standard Internet NNTP. Membership to ECS bulletin board groups is coordinated with ECS System Monitoring and Control Center (SMC) operations personnel. Network connectivity for bulletin board communications will be accomplished via the EBnet.

4.8 Data Exchange Between the ECS CSMS and the ASTER GDS CSMS

Network communications for the exchange of management data will use SMTP electronic mail (email) and will be formatted in a machine-parsable form. More detailed information describing the interfaces between the ECS CSMS and the ASTER GDS CSMS GSMS is contained in Section 8 of this ICD.

4.9 Expedited Data From The ECS GSFC DAAC to the ASTER GDS CSMS ADN/DADS

ECS will provide Expedited Data Sets (EDS) to the ASTER GDS for use in evaluating the operation of the instrument. Refer to Section 9 of this document for EDS overview and information related to EDS protocols, formats, authentication, etc.

This page intentionally left blank.

5. Interfaces Between the ECS FOS and the ASTER GDS AOS

5.1 Overview

This section describes the interfaces for data and information exchange between ECS FOS and the ASTER GDS AOS, including the transmission of planning and scheduling messages, planning aid files, instrument command information, reports, and coordination messages.

5.2 Planning and Scheduling Message Overview

5.2.1 Planning and Scheduling Data Exchange Protocols

All of the instrument planning and scheduling data flows identified in this section are transmitted between the ASTER ICC's ECS IST and an AOS Instrument Control Operations Subsystem (ICOS) host via the ICC LAN using FTP. The operational timeline associated with the generation and exchange of planning and scheduling messages will be defined in the Operations ICD EOS AM Spacecraft to ASTER.

5.2.2 Planning and Scheduling Message Data Conventions

The data items in the instrument planning and scheduling messages are in standard 8-bit ASCII format, unless stated otherwise. All data fields are fixed length fields. Data within the data fields shall be left-justified; if the data does not fill the entire length of the data field, the remaining bytes shall be filled with ASCII blanks. Unused data fields shall be filled with ASCII blanks.

Date and time fields are expressed in Universal Time Coordinated (UTC), unless stated otherwise.

Planning and Scheduling data files are limited in size to a maximum of 2 GB (the maximum size of a UNIX file). Planning and Scheduling data files will be uniquely identified by the following file naming convention:

ASTER Short Term Schedule (Scheduling Mode = Schedule): ASTER_STS_yyyydddnnn.txt

ASTER Short Term Schedule (Scheduling Mode = Analysis): ASTER_STA_yyyydddnnn.txt

ASTER One Day Schedule (Scheduling Mode = Schedule): ASTER_ODS_yyyydddnnn.txt

ASTER One Day Schedule (Scheduling Mode = Analysis): ASTER_ODA_yyyydddnnn.txt

Preliminary Resource Schedule (Scheduling Mode = Schedule): EOC_PRS_yyyydddnnn.txt

Preliminary Resource Schedule (Scheduling Mode = Analysis): EOC_PRA_yyyydddnnn.txt

Activity Schedule (Scheduling Mode = Schedule): EOC_ACS_yyyydddnnn.txt

Activity Schedule (Scheduling Mode = Analysis): EOC_ACA_yyyydddnnn.txt

Detailed Activity Schedule: EOC_DAS_yyyydddnnn.txt

Request for EOC Schedules: ASTER_REQ_yyyydddnnn.txt

where:

yyyyddd = the year and the three digit day-of-year of the generation of the message

nnn = a unique number (reset to 001 at the start of each day) assigned by the originator of the message.

Section 5.3 identifies the contents of each of these Planning and Scheduling data files. Sections 5.2.3 and 5.4 describe the format of the records contained within these files.

5.2.3 Planning and Scheduling Data Header

All of the instrument planning and scheduling messages exchanged between the ECS IST and the ASTER AOS will use the standard Planning and Scheduling Data Header shown in Table 5-1.

Table 5-1. Planning and Scheduling Data Header Format (1 of 2)

Field	Description	Type (Length in Bytes)	Values
Message Type	Identifies the type of message being transmitted	ASCII (3 B)	STS: ASTER Short Term Schedule PRS: Preliminary Resource Schedule ODS: ASTER One Day Schedule ACS: Activity Schedule DAS: Detailed Activity Schedule REQ: Request for EOC Schedule Transmission to the ASTER ICC
Message ID	The message ID is formatted as “yyyydddnnn”, where “yyyyddd” represents the four digit year and three digit day of year that the message was sent. The “nnn” portion of the ID is an incrementing sequence number identifying the scheduling message that was sent on that day. The incrementing sequence number shall begin with "001". The Message ID and the Message Type uniquely identify the Planning and Scheduling Message that is being sent.	ASCII (10 B)	yyyy: 1995 - 2100 ddd: 001 - 366 nnn: 001 - 999
Source	Identifies the sender of the message	ASCII (3 B)	AST: ASTER Instrument Control Center EOC: EOS Operations Center
Destination	Identifies the intended receiver of the message	ASCII (3 B)	AST: ASTER Instrument Control Center EOC: EOS Operations Center
Spacecraft Name	Identifies the spacecraft name	ASCII (3 B)	AM1: EOS AM-1 Spacecraft

Table 5-1. Planning and Scheduling Data Header Format (2 of 2)

Field	Description	Type (Length in Bytes)	Values
Instrument Name	Identifies the instrument name	ASCII (3 B)	AST: ASTER
Scheduling Mode	Specifies whether the activities identified in the message are to be scheduled on the EOC master schedule (SCHEDULE), or checked for constraints only for "what-if" analysis (ANALYSIS). For Message Type = "REQ" or "DAS", Scheduling Mode will always = "SCHEDULE".	ASCII (8 B)	SCHEDULE: Schedule on master EOC schedule ANALYSIS: Constraint-check only
Number of Days in File	The number of days in file is an integer that identifies the number of days of schedule data contained in this file. Partial days will be rounded up (e.g. 0.4 days will be represented as 1). For Message Type = REQ, this value should be "00".	ASCII (2 B)	00 - 99
Schedule Start Time	The Schedule Start Time represents the earliest activity start time contained in this schedule. The start time will be identified with the following format: yyyydddhhmmss. For Message Type = REQ, this field should contain the start time of the schedule to be transmitted to the ASTER ICC.	ASCII (13 B)	yyyy: 1995 - 2100 ddd: 001 - 366 hh: 00 - 23 mm: 00 - 59 ss: 00 - 59
Schedule Stop Time	The Schedule Stop Time represents the latest activity start time contained in the message contents. The stop time will be identified with the following format: yyyydddhhmmss. For Message Type = REQ, this field should contain the latest activity start time in the schedule to be sent to the ASTER ICC.	ASCII (13 B)	yyyy: 1995 - 2100 ddd: 001 - 366 hh: 00 - 23 mm: 00 - 59 ss: 00 - 59
Number of Scheduling Resources	The number of ASTER scheduling resources affected by this schedule. This field only applies to the STS and the ODS. This field will be set to zero for Request for EOC Schedules, Preliminary Resource Schedule, Activity Schedule, and Detailed Activity Schedule.	ASCII (2B)	00 - 99
Scheduling Resources	This field repeats (occurrences = "Number of Scheduling Resources" [previous field]). These fields contain the ASTER scheduling resource names that are affected by this schedule.	ASCII (40 B)	Valid Resource Names as defined in the EOS AM-1 PDB.
Number of Records in File	The number of records in file is an integer that identifies the number of records contained within this file (including the Planning and Scheduling Data Header).	ASCII (8 B)	00000001 - 99999999
Record Terminator	Identifies the end of the Planning and Scheduling Data Header	ASCII (1 B)	\n (new line character)

5.3 Schedule Messages

Section 5.3 describes the ASTER Short Term Schedule (STS), the ASTER One Day Schedule (ODS), the Preliminary Resource Schedule, Activity Schedule, and Detailed Activity Schedule. The ASTER STSs and ASTER ODSs are sent from the ASTER AOS to the ECS IST. The Preliminary Resource Schedules, Activity Schedules, and Detailed Activity Schedules are sent from the ECS IST to the AOS. The Preliminary Resource Schedule is generated and sent in response to the ASTER STS. The Activity Schedule is generated and sent in response to the ASTER ODS. The Detailed Activity Schedule is the conflict-free schedule that is used within the EOC to generate the integrated command load and the ground script.

Schedule Data Record formats for Activity Records, Parameter Records, DAR ID Records, Mode Records, Constraint Records, and Comment Records are described in Section 5.4.

5.3.1 ASTER Short Term Schedule (STS)

5.3.1.1 General

The ASTER STS is sent from the ASTER AOS to the ECS IST via the ICC LAN. The purpose of the STS is to provide initial activities, with specific timing, to the EOC for use in planning of AM-1 spacecraft resources and Tracking and Data Relay Satellite System (TDRSS) contact times. The STS identifies the resources required by the ASTER instrument during the period of time covered by the STS.

The Planning and Scheduling Data Header contains fields that indicate the number of scheduling resources and scheduling resource names that are affected by this STS. For STSs where the "Scheduling Mode" field is set to "SCHEDULE", the activities specified in the STS replace those activities on the affected resources on the EOC master schedule where the activity start times are between the "Start Time" and "Stop Time" fields in the Planning and Scheduling Data Header. Note that a STS that contains no activity records will result in the deletion of all ASTER activities on the affected resources whose Start Times fall within the inclusive window identified by the Schedule Start Time and Schedule Stop Time fields in the Planning and Scheduling Data Header. When the "Scheduling Mode" field is set to "ANALYSIS", the activities are checked for constraints only (i.e., the EOC master schedule is not modified) and the analysis results data format is the same as the SCHEDULE data format (with Scheduling Mode = ANALYSIS).

5.3.1.2 Detailed Data Description

The STS is described in Table 5-2. The Planning and Scheduling Data Header is the first record of the STS. The Planning and Scheduling Data Header specifies the Scheduling Mode of the STS as well as the Start Time and Stop Time of the activities that are included in the STS.

Table 5-2. Short Term Schedule Format

Field	Description	Type (Length in Bytes)	Values
Planning and Scheduling Data Header	Identifies the type of message being transmitted, the scheduling mode, and the time frame covered by the STS	ASCII (variable)	See Table 5-1
Activity Records, Parameter Records, DAR ID Records, Comment Records.	Short Term Schedule Data.	ASCII (variable)	See Tables 5-8 through 5-10 and 5-14

The Planning and Scheduling Data Header is followed by a list of Activity Records, Parameter Records, DAR ID Records, and Comment Records. Activity Records are in ascending start time order. The STS contains Activity Records for valid Data Base Defined Activities only. (Refer Section 5.4.1 for more information about Activity Records). If an Activity Record specifies that the number of parameters is greater than zero, then the Activity Record is immediately followed by one or more Parameter Records identifying all of the necessary parameters. If an Activity

Record specifies that the number of DAR IDs is greater than zero, then the Activity Record is followed by one or more DAR ID records identifying all of the relevant DAR IDs. If an Activity Record specifies both parameters and DAR IDs, the Parameter Record(s) appear first, followed by the DAR ID record(s).

Comment Records may be inserted anywhere in the STS after the Planning and Scheduling Data Header, except between an Activity Record and its associated Parameter Record(s) or DAR ID Record(s).

A sample of the ASTER STS file layout is shown in Figure 5-1.

5.3.2 ASTER One Day Schedule (ODS)

5.3.2.1 General

The ASTER ODS is sent from the ASTER AOS to the ECS IST via the ICC LAN. The purpose of the ODS is to provide the EOC with the schedule of planned ASTER activities (including scheduled times and resource needs) for a target day.

The Planning and Scheduling Data Header contains fields that indicate the number of scheduling resources and scheduling resource names that are affected by this ODS. For ODSs where the "Scheduling Mode" field is set to "SCHEDULE", the activities specified in the ODS replace those activities on the affected resources on the EOC master schedule where the activity start times are between the "Start Time" and "Stop Time" fields in the ODS Planning and Scheduling Data Header. Note that a ODS that contains no activity records will result in the deletion of all ASTER activities on the affected resources whose Start Time falls within the inclusive window identified by the Schedule Start Time and Schedule Stop Time fields in the Planning and Scheduling Data Header. When the "Scheduling Mode" field is set to "ANALYSIS", the activities are checked for constraints only (i.e, the EOC master schedule is not modified) and the analysis results data format is the same as the SCHEDULE data format (with Scheduling Mode = ANALYSIS).

Note: "Late change" ODSs received after the FOT has locked the Detailed Activity Schedule are automatically processed as "ANALYSIS". The FOT may apply the "Late Change" ODS to the EOC master schedule after verification that the ODS will result in a conflict-free Detailed Activity Schedule. If the late change ODS is applied to the Master Schedule, the ASTER AOS will be notified by automated ftp of the new detailed schedule. If the late change ODS is not applied to the Master Schedule the FOT will notify the AOS either verbally or via e-mail.

5.3.2.2 Detailed Data Description

The ODS is described in Table 5-3. The Planning and Scheduling Data Header is the first record of the ODS. The Planning and Scheduling Data Header specifies the Scheduling Mode of the ODS as well as the Start Time and Stop Time of the activities included in the ODS.

```
STS1999003001ASTEOCAM1ASTSCHEDULE48199902400000019990722359590 1ASTER
00000009
#This example shows the layout of sample records within an ASTER Short Term
Schedule
#The following record is a sample Data Base Defined Activity Record scheduled
by absolute time.
ACTABSASTER                                    TIR_ACTIVITY_A
1234567
                                                1999024013015
1999024013115                0000
#The following records are an example of a Data Base Defined Activity
scheduled by orbital event (EVT), #including DAR ID records.
ACTEVTASTER                                    VNIR1_ACTIVITY_Z
1234570
Node_Ascending                  0001222201-0200            Node_Ascending
0001222201+0700
                             0006
DARASTER_DAR_ID_22334455,ASTER_DAR_ID66497358,ASTER_DAR_ID_94329764,ASTER_DAR_
ID_56977777,ASTER_DAR_ID_65034674,
DARASTER_DAR_ID_00000001
#The following records are another example of a data base defined activity
scheduled by orbital event (EVT), #including Activity, Parameter Records and a
DAR ID record.
ACTEVTASTER                                    SWIR_ACTIVITY_XYZ
1234571
Node_Descending  0001222201-0200                           Node_Descending
0001222201+0700
                             0401
PRMCMD_MNEMONIC_1[1]PARAMETER_NAME_1=PARAMETER_VALUE,CMD_MNEMONIC_1[1]/PARAMET
ER_NAME_2=PARAMETER_VALUE,
PRMCMD_MNEMONIC_1[1]PARAMETER_NAME_3=PARAMETER_VALUE,CMD_MNEMONIC_2[2]/PARAMET
ER_NAME_1=PARAMETER_VALUE
DARASTER_DAR_ID_000008001
#
#
#Without the comment records, the STS records in the above examples would
appear as:
STS1999003001ASTEOCAM1ASTSCHEDULE48199902400000019990722359590 1ASTER
00000009
ACTABSASTER                                    TIR_ACTIVITY_A
1234567
                                                1999024013015
1999024013115                0000
ACTEVTASTER                                    VNIR1_ACTIVITY_Z
1234570
Node_Ascending                  0001222201-0200            Node_Ascending
0001222201+0700
                             0006
DARASTER_DAR_ID_22334455,ASTER_DAR_ID66497358,ASTER_DAR_ID_94329764,ASTER_DAR_
ID_56977777,ASTER_DAR_ID_65034674,
DARASTER_DAR_ID_00000001
ACTEVTASTER                                    SWIR_ACTIVITY_XYZ
1234571
Node_Descending  0001222201-0200                           Node_Descending
0001222201+0700
                             0401
PRMCMD_MNEMONIC_1[1]PARAMETER_NAME_1=PARAMETER_VALUE,CMD_MNEMONIC_1[1]/PARAMET
ER_NAME_2=PARAMETER_VALUE,
PRMCMD_MNEMONIC_1[1]PARAMETER_NAME_3=PARAMETER_VALUE,CMD_MNEMONIC_2[2]/PARAMET
ER_NAME_1=PARAMETER_VALUE
DARASTER_DAR_ID_000008001
```

Figure 5-1. Sample Short Term Schedule File Layout

Table 5-3. One Day Schedule Format

Field	Description	Type (Length in Bytes)	Values
Planning and Scheduling Data Header	Identifies the type of message being transmitted, the scheduling mode, and the time frame covered by the ODS	ASCII (variable)	See Table 5-1
Activity Records, Parameter Records, DAR ID Records, Comment Records.	One Day Schedule Data.	ASCII (variable)	See Tables 5-8 through 5-10 and 5-14

The Planning and Scheduling Data Header is followed by a list of Activity Records, Parameter Records, DAR ID Records, and Comment Records. Activity Records are in ascending start time order. The ODS contains Activity Records for valid Data Base Defined Activities only. If an Activity Record specifies that the number of parameters is greater than zero, then the Activity Record is immediately followed by one or more Parameter Records identifying all of the necessary parameters. If an Activity specifies that the number of DAR IDs is greater than zero, then the Activity Record is followed by one or more DAR ID records identifying all of the relevant DAR IDs. If an Activity Record specifies both parameters and DAR IDs, the Parameter Record(s) appear first, followed by the DAR ID record(s).

Comment Records may be inserted anywhere in the ODS after the Planning and Scheduling Data Header, except between an Activity Record and its associated Parameter Record(s) or DAR ID Record(s).

5.3.3 Preliminary Resource Schedule

5.3.3.1 General

The Preliminary Resource Schedule is automatically sent from the ECS IST to the ASTER AOS via automated FTP over the ICC LAN. The purpose of the Preliminary Resource Schedule is to provide all scheduled spacecraft and instrument activities, including TDRSS contact activities, to the ASTER AOS for the target week. The Preliminary Resource Schedule is generated in response to the ASTER STS.

5.3.3.2 Detailed Data Description

The Preliminary Resource Schedule is described in Table 5-4. The Planning and Scheduling Data Header is the first record of the Preliminary Resource Schedule. The Planning and Scheduling Data Header specifies the Scheduling Mode of the Preliminary Resource Schedule as well as the Start Time and Stop Time of the activities included in the Preliminary Resource Schedule. A Preliminary Resource Schedule with Scheduling Mode = SCHEDULE is sent in response to a STS with Scheduling Mode = SCHEDULE. A Preliminary Resource Schedule with Scheduling Mode = ANALYSIS is sent in response to a STS with Scheduling Mode = ANALYSIS.

Table 5-4. Preliminary Resource Schedule Format

Field	Description	Type (Length in Bytes)	Values
Planning and Scheduling Data Header	Identifies the type of message being transmitted, the scheduling mode, and the time frame covered by the Preliminary Resource Schedule.	ASCII (variable)	See Table 5-1
Activity Records, Parameter Records, DAR ID Records, Mode Records, and Constraint Records.	Preliminary Resource Schedule Data.	ASCII (variable)	See Tables 5-8 through 5-12 and 5-14

The Planning and Scheduling Data Header is followed by a list of Activity Records, Parameter Records, DAR ID Records, Mode Records, then Constraint Records.

Activity Records are in ascending start time order. The Activity Records (with their associated Parameter Records and DAR ID Records) appear first, followed by Mode Records, then Constraint Records. If an Activity Record specifies that the number of parameters is greater than zero, then the Activity Record is immediately followed by one or more Parameter Records identifying all of the necessary parameters. If an Activity Record specifies that the number of DAR IDs is greater than zero, then the Activity Record is followed by one or more DAR ID records identifying all of the relevant DAR IDs. If an Activity Record specifies both parameters and DAR IDs, the Parameter Record(s) appear first, followed by the DAR ID record(s).

Mode Records appear in ascending instrument mode time order. The mode characterizes an instrument or subsystem's operational state. Mode Records are generated by the FOS as a result of scheduling activities into the mission plan.

Mode Records are followed by a listing of Constraint Records. Constraint Records appear in ascending constraint start time order. Constraint Records appear as needed to identify constraint violations between activities. Constraints are identified as either "hard" or "soft" constraints. Hard constraints must be resolved prior to generation of the Detailed Activity Schedule. For soft constraints, the necessary coordination for constraints resolutions will be performed between the AOS and the EOC. The process for this coordination will be covered in the Operations ICD EOS AM Spacecraft to ASTER.

A sample of the Preliminary Resource Schedule file layout is shown in Figure 5-2.

5.3.4 Activity Schedule

5.3.4.1 General

The Activity Schedule is automatically sent from the ECS IST to the ASTER AOS via automated FTP over the ICC LAN. The purpose of the Activity Schedule is to provide the ASTER AOS with the EOC schedule of activities, including TDRSS contact activities, after receipt and processing of the ASTER ODS.

```
PRS1999003034EOCASTAM1ASTSCHEDULE4819990240000001999072235959000000134
2
ACTEVTCERES                                     CERES-ACTIVITY-12354
87656787
S/C_Night/Day                0001117401+00001999024000000S/C_Day/Night
0001117401+0130
1999024004745            0000
ACTABSMODIS                                     MODIS_ACTIVITY_676
81234589
                     1999024000015
1999024000115            0000
ACTABSASTER                                     TIR_ACTIVITY_A
123456778654389
                     1999024013015
19990240131150001 0.00100.00000000
ACTEVTASTER                                     VNIR1_ACTIVITY_Z
123457078655400
Node_Ascending               0001222201-02001999030024530Node_Ascending
0001222201+0700
19990300254300000 7.50050.00000006
DARASTER_DAR_ID_22334455,ASTER_DAR_ID66497358,ASTER_DAR_ID_94329764,ASTER_DAR_
ID_56977777,ASTER_DAR_ID_65034674,
DARASTER_DAR_ID_00000001
ACTABSAM1                                       TDRSS-CONTACT
46474888
                     1999030024645
1999030025645            0000
ACTEVTASTER                                     SWIR_ACTIVITY_XYZ
123457078685400
Node_Descending              0001222201-02001999030014500Node_Descending
0001222201+0700
1999030014700            0401
PRMCMD_MNEMONIC_1[1]PARAMETER_NAME_1=PARAMETER_VALUE,CMD_MNEMONIC_1[1]/PARAMET
ER_NAME_2=PARAMETER_VALUE,
PRMCMD_MNEMONIC_1[1]PARAMETER_NAME_3=PARAMETER_VALUE,CMD_MNEMONIC_2[2]/PARAMET
ER_NAME_1=PARAMETER_VALUE
DARASTER_DAR_ID_000008001
MODCERES                                        STDBY
19990241640001999024165900000 15.00
000.0000
MODCERES                                        SOLARCAL
19990241659001999024230000000 15.00
000.0000
MODCERES                                        BIAXIAL
1999024230000             00045.00
000.0009
CONMODIS                                        MOD_ACTIVITY_X
86344617
MOPITT                                    MOP_ACTIVITY_XYZ
99876567199902601 3025
1999026013030026S
```

Figure 5-2. Sample Preliminary Resource Schedule File Layout

5.3.4.2 Detailed Data Description

The Activity Schedule is described in Table 5-5. The Planning and Scheduling Data Header is the first record of the Activity Schedule. The Planning and Scheduling Data Header specifies the Scheduling Mode of the Activity Schedule as well as the Start Time and Stop Time of the activities included in the Activity Schedule. An Activity Schedule with Scheduling Mode = SCHEDULE is sent in response to a ODS with Scheduling Mode = SCHEDULE. An Activity Schedule with Scheduling Mode = ANALYSIS is sent in response to a ODS with Scheduling Mode = ANALYSIS.

The Planning and Scheduling Data Header is followed by a list of Activity Records, Parameter Records, DAR ID Records, Mode Records, and Constraint Records. The Activity Records (with their associated Parameter Records and DAR ID Records) appear first, followed by Mode Records, then Constraint Records.

Activity Records appear in ascending start time order. If an Activity Record specifies that the number of parameters is greater than zero, then the Activity Record is immediately followed by one or more Parameter Records identifying all of the necessary parameters. If an Activity Record specifies that the number of DAR IDs is greater than zero, then the Activity Record is followed by one or more DAR ID records identifying all of the relevant DAR IDs. If an Activity Record specifies both parameters and DAR IDs, the Parameter Record(s) appear first, followed by the DAR ID record(s).

Mode Records appear in ascending instrument mode time order. The mode characterizes an instrument or subsystem's operational state. Mode Records are generated by the FOS as a result of scheduling activities into the mission plan.

Mode Records are followed by a listing of Constraint Records. Constraint Records appear in ascending constraint start time order. Constraint Records appear as needed to identify constraint violations between activities. Constraints are identified as either "hard" or "soft" constraints. Hard constraints must be resolved prior to generation of the Detailed Activity Schedule.

Table 5-5. Activity Schedule Format

Field	Description	Type (Length in Bytes)	Values
Planning and Scheduling Data Header	Identifies the type of message being transmitted, the scheduling mode, and the time frame covered by the Activity Schedule.	ASCII (variable)	See Table 5-1
Activity Records, Parameter Records, DAR ID Records, Mode Records, and Constraint Records.	Activity Schedule Data.	ASCII (variable)	See Tables 5-8 through 5-12 and 5-14

5.3.5 Detailed Activity Schedule

5.3.5.1 General

The Detailed Activity Schedule is automatically sent from the ECS IST to the ASTER AOS via automated FTP over the ICC LAN. The purpose of the Detailed Activity Schedule is to provide the ASTER AOS with the conflict-free schedule that is used by the EOC to generate the AM-1 Spacecraft Control Computer (SCC) stored command loads and ground script. The Detailed Activity Schedule for a target day becomes available at the ECS IST when the Detailed Activity Schedule is generated for the EOC to prepare the operations day products (ground script and command loads). The Detailed Activity Schedule contains activities for all AM1 subsystems and instruments, including TDRSS contact activities.

5.3.5.2 Detailed Data Description

The Detailed Activity Schedule is described in Table 5-6. The Planning and Scheduling Data Header is the first record of the Detailed Activity Schedule. The Scheduling Mode of the Detailed Activity Schedule, as defined in the Planning and Scheduling Data Header is always set to "SCHEDULE". The Planning and Scheduling Data Header also identifies the Start Time and Stop Time of the activities included in the Detailed Activity Schedule.

The Planning and Scheduling Data Header is followed by a list of Activity Records, Parameter Records, DAR ID Records, Mode Records, and Constraint Records. The Activity Records (with their associated Parameter Records and DAR ID Records) appear first, followed by Mode Records, then Constraint Records.

Activity Records appear in ascending start time order. If an Activity Record specifies that the number of parameters is greater than zero, then the Activity Record is immediately followed by one or more Parameter Records identifying all of the necessary parameters. If an Activity Record specifies that the number of DAR IDs is greater than zero, then the Activity Record is followed by one or more DAR ID records identifying all of the relevant DAR IDs. If an Activity Record specifies both parameters and DAR IDs, the Parameter Record(s) appear first, followed by the DAR ID record(s).

Table 5-6. Detailed Activity Schedule Format

Field	Description	Type (Length in Bytes)	Values
Planning and Scheduling Data Header	Identifies the type of message being transmitted, the scheduling mode, and the time frame covered by the Detailed Activity Schedule. For Detailed Activity Schedule messages, the scheduling mode field is always = “SCHEDULE”.	ASCII (variable)	See Table 5-1
Activity Records, Parameter Records, DAR ID Records, Mode Records, and Constraint Records.	Detailed Activity Schedule Data.	ASCII (variable)	See Tables 5-8 through 5-12 and 5-14

Mode Records appear in ascending instrument mode time order. The mode characterizes an instrument or subsystem's operational state. Mode Records are generated by the FOS as a result of scheduling activities into the mission plan.

Mode Records are followed by a listing of Constraint Records. Constraint Records appear in ascending constraint start time order. Constraint Records appear as needed to identify soft constraint violations between activities. Activities with hard constraint violations must be resolved prior to generation of the Detailed Activity Schedule, therefore hard constraint violations will not appear in the Detailed Activity Schedule Constraint Records.

5.4 Schedule Data Record Formats

5.4.1 Activity Records

The EOC performs scheduling of spacecraft and instrument operations through the use of data constructs called activities. Planning and Scheduling inputs (e.g., the ASTER STS and ODS) and the resulting EOC schedules (e.g., Preliminary Resource Schedule, Activity Schedule, and Detailed Activity Schedule) include lists of Activity Records which describe planned and scheduled spacecraft and instrument operations.

Data Base Defined Activities are applicable for any of the AM-1 instruments or subsystems. Data Base Defined Activities reference pre-defined, pre-validated, configuration-controlled activities which are stored in the EOC and ASTER ICC Data Bases. A Data Base Defined Activity which does not have any commands associated with it is called a Label Activity. Label Activities may be used to annotate events.

Data Base Defined Activities, may be scheduled with respect to Absolute Time or Orbit Events. Table 5-7 provides the list of valid scheduling Orbit Events. The desired scheduling method for each activity is identified by the "Scheduling Type" field (ABS or EVT) of the Activity Record. The Activity Record is described in Table 5-8. Refer to Figures 5-1 and 5-2 for examples of Activity Records.

5.4.2 Parameter Records

If an Activity Record specifies that the number of parameters is greater than zero, then the Activity Record is immediately followed by one or more Parameter Records identifying all of the necessary parameters. If all of the required parameter specifications do not fit within a single Parameter Record, additional Parameter Records are used. The number of Parameter specifications must equal the Number of Parameters field from the Activity Record. A Parameter specification (mnemonic/parameter name = value) cannot be split across different Parameter Records. If a given mnemonic/parameter name occurs multiple times in the Activity definition, then a Parameter specification must include the command occurrence number of the command mnemonic whose parameter is being specified. Command occurrence numbers are assigned sequentially within an activity definition beginning with 1. The Parameter Record is described in Table 5-9. Refer to Figures 5-1 and 5-2 for examples of Parameter Records.

Table 5-7. Orbit Event Mnemonics

Event Mnemonic	Event	Definition
(refer to ECS/FDD ICD)	Spacecraft sunrise	The time that the spacecraft passes into daylight
(refer to ECS/FDD ICD)	Spacecraft sunset	The time that the spacecraft passes into night
(refer to ECS/FDD ICD)	Night/Day boundary of earth nadir crossing	The time that the spacecraft nadir track crosses the day/night terminator (from night to day) on the earth's surface
(refer to ECS/FDD ICD)	Day/Night boundary of earth nadir crossing	The time that the spacecraft nadir track crosses the day/night terminator (from day to night) on the earth's surface
(refer to ECS/FDD ICD)	Ascending node crossing time	The time that the spacecraft crosses the equator while traveling from South to North
(refer to ECS/FDD ICD)	Descending node crossing time	The time that the spacecraft crosses the equator while traveling from North to South
(refer to ECS/FDD ICD)	Eclipse Entry time	The time that the spacecraft nadir passes into a shadow region defined on the earth's surface
(refer to ECS/FDD ICD)	Eclipse Exit time	The time that the spacecraft nadir passes out of a shadow region defined on the earth's surface
(refer to ECS/FDD ICD)	South Atlantic Anomaly (SAA) Entry time	The time that the spacecraft enters the South Atlantic Anomaly region
(refer to ECS/FDD ICD)	SAA Exit time	The time that the spacecraft exits the South Atlantic Anomaly region
Apogee	Apogee time	The time that the spacecraft reaches the farthest point from Earth in the orbit
Perigee	Perigee time	The time that the spacecraft reaches the closest point to Earth in the orbit
(refer to ECS/FDD ICD)	Spacecraft noon	The time of spacecraft noon.
(refer to ECS/FDD ICD)	Spacecraft minimum latitude	The time that the spacecraft crosses the minimum latitude point.
(refer to ECS/FDD ICD)	Spacecraft maximum latitude	The time that the spacecraft crosses the maximum latitude point.
(refer to ECS/FDD ICD)	Van Allen Belt Entry time	The time that the spacecraft enters the Van Allen Belt region.
(refer to ECS/FDD ICD)	Van Allen Belt Exit time	The time that the spacecraft exits the Van Allen Belt region.

Table 5-8. Activity Record Format (1 of 4)

Field	Description	Type (Length in Bytes)	Values
Record Type	Indicates that this is an Activity Record	ASCII (3B)	ACT
Scheduling Type	Indicates the type of scheduling used for the activity (i.e., absolute time or event-based)	ASCII (3 B)	ABS: scheduled based on absolute time EVT: scheduled as an offset from a scheduling event
Activity Resource Name	Identifies the scheduling resource upon which the activity is scheduled. Valid resource names are defined in the EOS AM-1 Project Data Base (PDB). The STS and ODS will only contain activities for ASTER scheduling resources.	ASCII (40 B)	Valid Activity Resource Name as defined in the EOS AM-1 Project Data Base.
Activity Name	Identifies the activity definition name in the EOC data base	ASCII (40 B)	A valid activity name defined in the EOC data base.
ASTER Activity ID	An integer value that uniquely identifies this activity. The ID is formatted as "nnnnnnn", where "nnnnnnn" is a unique number assigned to this activity by the ASTER ICC.	ASCII (7 B)	nnnnnnn: 0000000 - 9999999

Table 5-8. Activity Record Format (2 of 4)

Field	Description	Type (Length in Bytes)	Values
EOC Activity ID	An integer value that uniquely identifies this activity. The ID is formatted as "nnnnnnnn", where "nnnnnnnn" is a unique number assigned to this activity by the EOC when the activity is scheduled. The EOC Activity ID is used for coordination between the STS-Preliminary Resource Schedule and ODS-Activity Schedule. For STS and ODS, this field is filled with ASCII blanks.	ASCII (8 B)	nnnnnnnn: 00000000 - 99999999
Start Event	The Start Event identifies the scheduling event on which the reference activity "START" point (as defined in the activity definition in the data base) is based. Note: The reference activity "START" is not necessarily equal to the execution time of the first command in the activity. The Start Event is specified as EVENT ORBIT SEQNO, where EVENT represents a mnemonic for a valid scheduling event (fixed length 32 characters); ORBIT represents the orbit number (fixed length 8 digits, as defined in FDF planning aids); and SEQNO represents the sequential number of the event in the specified orbit (fixed length 2 digits). For those events that occur only once in an orbit, the SEQNO is always "01". This field is filled with ASCII blanks when Scheduling Type = ABS.	ASCII (42 B)	EVENT: (see Table 5-7) ORBIT: 00000000 - 99999999 SEQNO: 01 - 99
Start Event Delta	The Start Event Delta is represented by a sign (+ or -) and "mmss" to indicate the time (minutes and seconds) offset from the Start Event on which the activity is scheduled. This field is filled with ASCII blanks when Scheduling Type = ABS. A zero delta is represented as “+0000”.	ASCII (5 B)	sign: + or - mm: 00 - 99 ss: 00 - 59
Activity Start Time	The Activity Start Time specifies the reference activity "START" point (as defined in the activity definition in the data base) for this activity. Note: The reference activity "START" is not necessarily equal to the execution time of the first command in the activity. The ASTER ICC may insert either blanks or a computed reference activity "START" Time for activities which are scheduled based on events. For activities which are scheduled based on events, EOC will overwrite this field with the most accurate computed reference activity "START" Time based on the latest FDF predicts. The start time will be in the following format: yyyydddhhmmss.	ASCII (13 B)	yyyy: 1995 - 2100 ddd: 001 - 366 hh: 00 - 23 mm: 00 - 59 ss: 00 - 59

Table 5-8. Activity Record Format (3 of 4)

Field	Description	Type (Length in Bytes)	Values
Stop Event	The Stop Event identifies the scheduling event on which the reference activity "STOP" point (as defined in the activity definition in the data base) is based. Note: The reference activity "STOP" is not necessarily equal to the execution time of the last command in the activity. The Stop Event is specified in the same format as the Start Event. This field is filled with ASCII blanks when Scheduling Type = ABS. This field is filled with ASCII blanks when the data base definition for this activity does not have a reference "STOP" point.	ASCII (42 B)	EVENT: (see Table 5-7) ORBIT: 00000000 - 99999999 SEQNO: 01 - 99
Stop Event Delta	The Stop Event Delta is represented by a sign (+ or -) and "mmss" to indicate the time (minutes and seconds) offset from the Stop Event on which the activity stop time is scheduled. This field is filled with ASCII blanks when Scheduling Type = ABS. A zero delta is represented as “+0000”.	ASCII (5 B)	sign: + or - mm: 00 - 99 ss: 00 - 59
Activity Stop Time	The Activity Stop Time specifies the reference activity "STOP" point (as defined in the activity definition in the data base) for this activity. Note: The reference activity "STOP" is not necessarily equal to the execution time of the last command in the activity. The ASTER ICC may insert either blanks or a computed reference activity "STOP" Time for activities which are scheduled based on events. For activities scheduled based on events, EOC will overwrite this field with the most accurate computed reference activity "STOP" Time based on the latest FDF predicts. The stop time will be in the following format: yyyydddhhmmss.	ASCII (13 B)	yyyy: 1995 - 2100 ddd: 001 - 366 hh: 00 - 23 mm: 00 - 59 ss: 00 - 59
Start Pointing Angle (Data Base Defined Activities for Slewing)	For Data Base Defined Activities for Slewing, the start pointing angle is expressed as a sign (+ or -) and degrees. The pointing angle is expressed as the cross-track angular value, where +0000.00 represents nadir pointing. For non-slewing data base defined activities, the STS and ODS contain ASCII blanks for this field.	ASCII (8 B)	-0180.00 - +0180.00 (Start Pointing Angle, as defined by the slew angle with reference to the AM-1 spacecraft Y-axis, as defined in the spacecraft coordinate system.)
Stop Pointing Angle (Data Base Defined Activities for Slewing)	For Data Base Defined Activities for Slewing, the stop pointing angle is expressed as a sign (+ or -) and degrees. The pointing angle is expressed as the cross-track angular value, where +0000.00 represents nadir pointing. For non-slewing data base defined activities, the STS and ODS contain ASCII blanks for this field.	ASCII (8 B)	-0180.00 - +0180.00 (Stop Pointing Angle, as defined by the slew angle with reference to the AM-1 spacecraft Y-axis, as defined in the spacecraft coordinate system.)

Table 5-8. Activity Record Format (4 of 4)

Field	Description	Type (Length in Bytes)	Values
Number of Parameters	Identifies the number of user-specified parameters associated with this activity. If there are no user-specified parameters associated with this activity, the value must be "00".	ASCII (2 B)	00 - 99
Number of DAR IDs	Specifies the number of DARs associated with this activity. If there are no DARs associated with this activity, the value must be “00”.	ASCII (2 B)	00 - 99
Record Terminator	Identifies the end of this Activity Record	ASCII (1 B)	\n (new line character)

Table 5-9. Parameter Record Format

Field	Description	Type (Length in Bytes)	Values
Record Type	Indicates that this is a Parameter Record.	ASCII (3 B)	PRM
Parameter List	Listing of Parameters (separated by commas) associated with the previous activity record. Each parameter specification is expressed as: command mnemonic [CMD#][1] /parameter name = value..	ASCII (<= 154 B)	Parameter Specifications in the format: "Command Mnemonic [CMD #] /Parameter Name = Value", where Command Mnemonic is a valid activity command mnemonic in the EOC data base and Parameter Name is a valid parameter name in the EOC data base for the referenced command mnemonic. Valid Command Mnemonics and Parameter Names (Command Subfields) are defined in the EOS AM-1 Project Data Base.
Record Terminator	Identifies the end of the Parameter Record	ASCII (1 B)	\n (new line character)

[1]The command occurrence number is required for a command whose parameter is being modified, because the referenced command mnemonic may appear more than once within an activity definition. Commands are numbered sequentially in an activity definition, beginning with 1. The command occurrence number reference will be entered as [5], for example, to specify the fifth command mnemonic in the activity definition.

5.4.3 DAR ID Records

If an Activity Record specifies that the number of DAR IDs is greater than zero, then the Activity Record is followed by one or more DAR ID records identifying all of the relevant DAR IDs. If an Activity Record specifies both parameters and DAR IDs, the Parameter Record(s) appear first, followed by the DAR ID record(s). If all of the required DAR IDs do not fit within a single DAR ID Record, additional DAR ID Records are used. DAR IDs are not split across different DAR ID Records. The DAR ID Record is described in Table 5-10. Refer to Figures 5-1 and 5-2 for examples of DAR ID Records.

Table 5-10. DAR ID Record

Field	Description	Type (Length in Bytes)	Values
Record Type	Indicates that this is a DAR ID Record.	ASCII (3 B)	DAR
DAR ID List	Listing of DAR IDs associated with the previous activity record. DAR IDs are separated by commas.	ASCII (<=154 B)	As determined by ASTER GDS
Record Terminator	Identifies the end of the DAR ID Record	ASCII (1 B)	\n (new line character)

5.4.4 Mode Records

Mode records give operational states of instruments and spacecraft subsystems. Commanding within activities which are scheduled into the mission plan cause instruments and subsystems to transition into various modes. Usually modes are associated with power and data rate information which can be found in the activity definition data base. Mode records will contain a mode name, instrument or subsystem associated with the mode change, power, data rate and the start and stop time of the mode. The Mode Record format is described in Table 5-11. Refer to 5-2 for examples of Mode Records.

5.4.5 Constraint Records

Constraint information is included in Preliminary Resource Schedules, Activity Schedules, and Detailed Activity Schedules. The purpose of the constraint information is to provide detailed information pertaining to scheduling constraint violations and error conditions. The constraint information includes constraint violations for all instruments and spacecraft subsystem activities. If the activity is constrained by more than one activity, a separate Constraint Record is provided for each violation. The Constraint Record is described in Table 5-12. Refer to Figure 5-2 for examples of Constraint Records.

5.4.6 Comment Records

Comment records are optional and may be included in STS or ODS. Comment records are not contained in the Preliminary Resource Schedule, Activity Schedule, or Detailed Activity Schedule. Comment Records are used for annotation only; these records are not processed by the EOC scheduling software. The Comment Record is described in Table 5-14. Refer to Figure 5-1 for examples of Comment Records.

5.5 Request for EOC Schedules

5.5.1 General

The Request for EOC Schedules is sent from the ASTER AOS to the ECS IST. The purpose of the Request for EOC Schedules is to request the ECS IST to obtain a report of a particular portion of the integrated EOC master schedule. This integrated schedule will be an Activity Schedule containing activity schedule data for all EOS AM-1 subsystems and instruments for the time frame specified in the Planning and Scheduling Data Header.

Table 5-11. Mode Record Format

Field	Description	Type (Length in Bytes)	Values
Record Type	Indicates that this is a Mode Record	ASCII (3 B)	MOD: indicates a Mode Record
Mode Resource Name	Identifies the scheduling resource with which the mode is associated. Valid instrument/ subsystem names are defined in the EOS AM-1 Project Data Base.	ASCII (40 B)	Valid Mode Resource Name as defined in the EOS AM-1 Project Data Base.
Mode name	New Mode name as defined in the EOS AM-1 Project Data Base.	ASCII (30B)	A valid new mode name defined in the PDB.
Mode Start Time	The Mode Start Time specifies the Start Time of this mode. The start time will be in the following format: yyyydddhhmmss.	ASCII (13 B)	yyyy: 1995 - 2100 ddd: 001 - 366 hh: 00 - 23 mm: 00 - 59 ss: 00 - 59
Mode Stop Time	The Mode Stop Time specifies the Stop Time of this mode. The stop time will be in the following format: yyyydddhhmmss. For contiguous mode records, the stop time of the previous record will be the same as the start time of the next record. If this is the last record in the list, the stop time field will be blank, indicating that the instrument or subsystem remains in the most recently scheduled mode.	ASCII (13 B)	yyyy: 1995 - 2100 ddd: 001 - 366 hh: 00 - 23 mm: 00 - 59 ss: 00 - 59
Average Power	The average power specifies the average number of watts consumed during the mode.	ASCII (8 B)	00000.00 - 99999.99 (Power)
Data Rate	The data rate specifies the average rate at which data is being stored in the buffer during the mode. The data rate is specified in units of MBits/second.	ASCII (8 B)	000.0000 - 999.9999 (Data Rate)
Record Terminator	Identifies the end of this Mode Record	ASCII (1 B)	\n (new line character)

Table 5-12. Constraint Record (1 of 2)

Field	Description	Type (Length in Bytes)	Values
Record Type	Indicates that this is a Constraint Record	ASCII (3 B)	CON: indicates a Constraint Record
Resource Name	Identifies the scheduling resource upon which the constraint is detected. Valid resource names are defined in the EOS AM-1 Project Data Base.	ASCII (40 B)	Valid Resource Name as defined in the AM-1 Project Data Base.
Activity Name	Identifies the activity name of the activity involved in the constraint violation.	ASCII (40 B)	A valid activity name defined in the PDB. For constraints related to consumables (power, data volume), this field is filled with blanks.
EOC Activity ID	An integer value that uniquely identifies the activity that is under constraint. The ID is formatted as "nnnnnnnn", where "nnnnnnnn" is a unique number assigned to this activity by the EOC when the activity is scheduled. Note: In those cases where an ASTER Activity is not scheduled (Constraint Flag = E), this field will contain the ASTER Activity ID from the STS or ODS.	ASCII (8 B)	nnnnnnnn: 00000000 - 99999999 For constraints related to consumables (power, data volume), this field is filled with blanks.
Constraining Resource Name	Identifies the scheduling resource with which the activity is constrained. Valid resource names are defined in the EOS AM-1 Project Data Base.	ASCII (40 B)	Valid Activity or Mode Resource Name as defined in the EOS AM-1 Project Data Base. For constraints related to consumables (power, data volume), this field is filled with blanks.
Constraining Activity Name	Identifies the activity name of the activity involved in the constraint violation.	ASCII (40 B)	A valid activity name defined in the PDB. For constraints related to consumables (power, data volume), this field is filled with blanks.
Constraining EOC Activity ID	An integer value that uniquely identifies the activity that is causing the constraint. The ID is formatted as "nnnnnnnn", where "nnnnnnnn" is a unique number assigned to this activity by the EOC when the activity is scheduled. Note: In those cases where an ASTER Activity is not scheduled (Constraint Flag = E), this field will contain the ASTER Activity ID from the STS or ODS.	ASCII (8 B)	nnnnnnnn: 00000000 - 99999999 For constraints related to consumables (power, data volume), this field is filled with blanks.

Table 5-12. Constraint Record (2 of 2)

Field	Description	Type (Length in Bytes)	Values
Constraint Start Time	The constraint start time identifies the time the constraint violation begins. The constraint start time will be identified with the following format: yyyydddhhmmss. For constraints related to consumables (power and data volume), if the constraint start time occurs at a time that is equal to or prior to the Scheduling Data Header "Schedule Start Time", this field will be equal to the "Schedule Start Time".	ASCII (13 B)	yyyy: 1995 - 2100 ddd: 001 - 366 hh: 00 - 23 mm: 00 - 59 ss: 00 - 59
Constraint Stop Time	The constraint stop time identifies the time the constraint violation ends. The constraint stop time will be identified with the following format: yyyydddhhmmss. For constraints related to consumables (power and data volume), if the constraint stop time occurs at a time that is equal to or after the Scheduling Data Header "Schedule Stop Time", this field will be equal to the "Schedule Stop Time".	ASCII (13 B)	yyyy: 1995 - 2100 ddd: 001 - 366 hh: 00 - 23 mm: 00 - 59 ss: 00 - 59
Flag and Error/Constraint Code	The flag & error/constraint code provides information that describes the error or constraint violation. The format of the flag & error/constraint code is "Fnn", where "F" = the flag and "nn" is a valid error/constraint code. Valid flags and error/constraint codes are in Table 5-13.	ASCII (3 B)	See Table 5-13
Constraint Type	The constraint type specifies if the constraint is a "hard" or "soft" constraint. Hard constraints must be resolved prior to generation of the Detailed Activity Schedule	ASCII (1B)	H = hard constraint S = soft constraint
Record Terminator	Identifies the end of this Constraint Record	ASCII (1 B)	\n (new line character)

Table 5-13. Error/Constraint Codes (1 of 2)

Flag	Error/Constraint Code	Explanation
		Planning and Scheduling File Errors
F	01	Unrecognized file. File name does not comply with file naming convention
F	02	Duplicate file name. A unique file name was not provided, as required by the file naming convention
	03 - 09	Spare
		Planning and Scheduling Data Header Errors
F	10	Invalid value in Message Type field
F	11	Invalid Source
F	12	Invalid Destination
F	13	Invalid Spacecraft Name
	14	Spare
F	15	Invalid Scheduling Mode
F	16	Invalid Number of Days in File
F	17	Invalid/Unrecognized Time for Schedule Start Time or Schedule Stop Time
F	18	Stop time is earlier than Start time
F	19	Incomplete file (File contents do not match Number of Records in the Planning and Scheduling Data Header)
F	20	Invalid Number of Resources
F	21	Invalid Resource Name in Scheduling Resource list
F	22	Invalid number of records (i.e., not an integer)
F	23	Unauthorized Resource Name in Scheduling Resource List
	24-35	Spare
		Scheduling Record Errors
E	36	Invalid Scheduling Record Type
E	37	Invalid Instrument/Subsystem Name
E	38	Activity Name not found in PDB
E	39	Invalid Activity ID
E	40	Invalid Orbit Event
E	41	Activity could not be scheduled. FDF orbit event data unavailable.
E	42	Invalid Orbit/Sequence Number
E	43	Invalid Delta Time
E	44	Invalid Resource Value (Power, Data Rate, Pointing Angle)
E	45	Number of Parameters in Activity Record does not match the number of parameters provided in the corresponding Parameter Record
E	46	Number of DAR IDs in Activity Record does not match DAR ID Record
E	47	Unrecognized parameter names (command mnemonic/parameter name or command submnemonic/parameter name)
E	48	Invalid Value specified for parameter
E	49	Missing Parameter (a parameter has not been specified and a default value has not been specified in the Activity definition)
E	50	Invalid Start Time. The start time does not fall within the start/stop range specified in the Planning and Scheduling Header
E	51	User not authorized to schedule this Activity Name

Table 5-13. Error/Constraint Codes (2 of 2)

Flag	Error/Constraint Code	Explanation
E	52	Activity attempts to modify a non-modifiable parameter
E	53	Invalid/Unrecognized start or stop time
E	54	Activity duration is less than the minimum duration defined in the PDB
	55-65	Spare
		Activity Constraint Violations
W	66	Power consumption constraint exceeded
W	67	Data volume constraint exceeded
W	68	Activity prerequisite condition not met (e.g., entry mode violation)
W	69	Constraint violation exists between 2 activities
W	70	Constraint violation exists between activity and orbit event
	71 - 99	Spare

Explanation of Flags:
F = Error; File not processed
E = Error; Activity Record was not processed
W = Warning only; Activity Record was processed

Table 5-14. Comment Record Format

Field	Description	Type (Length in Bytes)	Values
Record Type	Indicates that this is a Comment Record. A comment record is identified by an ASCII "#" in column 1 of the record.	ASCII (1 B)	#
Comment Text	User-defined comment text.	ASCII (<=154 B)	ASCII text
Record Terminator	Identifies the end of the Comment Record	ASCII (1 B)	\n (new line character)

5.5.2 Detailed Data Description

The Request for EOC Schedules is described in Table 5-15. The Planning and Scheduling Data Header is the only record of the Request for EOC Schedules.

Table 5-15. Request for EOC Schedules Format

Field	Description	Type (Length in Bytes)	Values
Planning and Scheduling Data Header	Identifies the type of message being transmitted (REQ) and the time frame covered by the requested EOC schedule data. For Request for EOC Schedules messages, the scheduling mode field will always = “SCHEDULE”.	ASCII (variable)	See Table 5-1

5.6 Planning Aids

Planning Aids are automatically sent from the FOS to the ASTER AOS via automated FTP over EBnet. Planning aid files are sent to the ASTER AOS whenever new planning aids are received from the GSFC Flight Dynamics Facility (FDF) and successfully ingested into the FOS. The purpose of Planning Aids are to provide the ASTER AOS with orbital information for use in planning and scheduling the ASTER instrument.

Planning aids that will be sent to the ASTER AOS are:

a. Predicted EOS-AM1 Ephemeris

b. Predicted Orbital Events

c. Predicted Orbit Number and Start Time

d. Predicted Subsatellite Point (Ground Track)

e. Orbit Adjust Maneuver Request

f. Orbit Adjust Burn Times and Duration

Refer to the Earth Observing System (EOS) - AM1 Flight Dynamics Facility (FDF)/EOSDIS Core System (ECS) Interface Control Document for a complete listing of Planning Aid contents and data formats.

5.7 Project Data Base Updates

The ASTER IOT submits changes to the ASTER portion of the AM-1 PDB (command, telemetry, activity, and constraint definitions) through the tools provided in the ECS IST toolkit. PDB updates are validated, approved, and placed under configuration control at the EOC prior to usage in operations.

The ASTER IOT may retrieve AM-1 PDB definitions (command, telemetry, activity, and constraint definitions) through the tools provided in the ECS IST toolkit. The PDB updates may be retrieved in the form of display, reports, or PDB text files. The detailed format of PDB text files are defined in the Flight Operations Segment (FOS) Database Design and Database Schema Specifications for the ECS Project and the Data Format Control Document for the Earth Observing System (EOS) AM-1 Project Data Base.

After the PDB text files have been retrieved from the EOC, these files may be sent by operator-initiated FTP from the ECS IST to the ASTER AOS.

5.8 Absolute Time Command (ATC) Load Report

The purpose of the ATC Load Report is to provide the ASTER ICC with information on the contents of the AM-1 SCC stored command load that was generated from the Detailed Activity Schedule. The ATC Load Report is generated prior to the start of the target day.

The ATC Load Report is accessible through the ECS IST GUI.

Figure 5-3 shows the preliminary layout of the ATC Load Report text file.

```
                                    A M - 1   A T C   L O A D   R E P O R T
PAGE   1

                                Mission name                        AM-1
                                Satellite ID  (I)                   nn, (Hex =   xx)
                                Load name:                          AM1_ATC_xxxxxxxxxxxxxxxxxxx
                                Load creation time:                 yyyy:ddd:hh:mm:ss
                                Load execution times - first cmd:   yyyy:ddd:hh:mm:ss
                                                     - last cmd:    yyyy:ddd:hh:mm:ss
                                Load after time:                    yyyy:ddd:hh:mm:ss
                                Load by time:                       yyyy:ddd:hh:mm:ss


                                Est. time for uplinking     = 000000
                                Load Size in Bytes          = nnnnn
                                Primary uplink              = yyyy:ddd:hh:mm:ss
                                Secondary uplink            = yyyy:ddd:hh:mm:ss
                                Tertiary uplink             = yyyy:ddd:hh:mm:ss
                                # commands in load          = nnnn
                                # critical commands         = nnnn
                                Starting Location #         = nnnn
                                Ending Location #           = nnnn


Listing of Control Commands:
Command #   48-bit command data (Octal)      48-bit command data (Hexadecimal)    Decoded data
(Hexadecimal)
            --------------------------      ---------------------------------    ---------------
----------
   n  =       nnn nnn nnn nnn nnn nnn            xx  xx  xx  xx  xx  xx             xx  xx  xx
xx  xx  xx

------------------------------------------------------------------------------------------------
--------------------

                                    A M - 1   A T C   L O A D   R E P O R T
PAGE   n

  MEMORY          COMMAND        TIME TAGS   INH     COMMAND           SUBMNEMONIC/
CRIT     CMD DATA
 LOCATION     EXECUTION TIME      (OCTAL)    GRP     MNEMONIC            VALUE
FLAG     (OCTAL)
----------   -----------------   ---------   ---    -------------      ------------            --
--   ------------
  nnn        yyyy:ddd:hh:mm:ss   nnnnnnnnn   nn     Cmd_Mnemonic
x     nnnnnnnnn
  nnn        yyyy:ddd:hh:mm:ss   nnnnnnnnn   nn     Cmd_Mnemonic        Sub = Value
x     nnnnnnnnn
                                                                        Sub = Value
x     nnnnnnnnn
  nnn        yyyy:ddd:hh:mm:ss   nnnnnnnnn   nn     Cmd_Mnemonic        Sub = Value
x     nnnnnnnnn

************************************************** REPORT END
**************************************************
```

Figure 5-3. ATC Load Report File Layout

5.9 Integrated Report

The purpose of the Integrated Report is to provide the ASTER ICC with information on the operations plan for the target day, including the ground script and the contents of the AM-1 SCC stored command load that was generated from the Detailed Activity Schedule. The Integrated Report is generated prior to the start of the target day.

The Integrated Report is accessible through the ECS IST GUI.

Figure 5-4 shows the preliminary layout of the Integrated Report text file.

5.10 Command Procedures

The ASTER IOT may define Command Procedures and input these Command Procedures to the ECS IST. Command Procedures typically contain a set of ECS Command Language (ECL) directives that perform a single function at the EOC (e.g., configure a portion of the EOC ground system or initiate transmission of commands from the EOC to safe an instrument). After approval, these Command Procedures may be executed in the EOC by the Flight Operations Team (FOT). Command Procedures are classified as either Normal or Contingency.

Command Procedures are input to the ECS IST (Procedure Builder tool). Using an ECS IST tool, the Command Procedure file is sent to the FOT at the EOC for approval. Command Procedures are approved and validated by the EOC prior to use in operations.

Each Command Procedure contains a time ordered listing of ECL directives and optional ECL logic statements. Refer to the ECS IST Toolkit documentation for more information on Command Procedures and the Procedure Builder tool.

5.11 Relative Time Command Sequences

The ASTER IOT may define Relative Time Command Sequences (RTCS) and input these RTCSs to the ECS IST. Approved RTCSs are uplinked and stored onboard the spacecraft. An RTCS is a pre-defined set of commands which performs the same instrument activity on a routine basis. Execution of commands within a RTCS is based on the specified relative time offset between each command.

RTCS are input to the ECS IST through the ECS IST GUI (RTS Load Builder tool). At the request of the ECS IST operator, the RTCS is sent to the FOT at the EOC for approval. RTCSs are approved and validated by the EOC prior to uplink to the spacecraft.

Each RTCS includes a list of command mnemonics (including any submnemonics or required command parameters), a relative time offset for each command, and a text description for each command. Refer to the ECS IST Toolkit documentation for more information on RTCSs and the RTS Load Builder tool.

```
                                A M - 1   I N T E G R A T E D   R E P O R T
PAGE   1

                              Mission name                      AM-1
                              Satellite ID  (I)                 nn, (Hex =   xx)
                              Report file:
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx.RPT
                              Reporting Period Start Time:      yyyy:ddd:hh:mm:ss
                              Reporting Period Stop Time:       yyyy:ddd:hh:mm:ss


------------------------------------------------------------------------------------------------
--------------------

                                A M - 1   I N T E G R A T E D   R E P O R T
PAGE   n

yyyy:ddd:hh:mm:ss     ECL Directive from the Ground Script
               !Descriptive Text
yyyy:ddd:hh:mm:ss     /Cmd_Mnemonic Submnemonic=Value
               !Cmd_Description of RT Cmd
yyyy:ddd:hh:mm:ss                  Orbit Event                                        !Label
Activity Description

       ATC Loc nnnn   Cmd_Mnemonic          Submnemonic=Value     yyyy:ddd:hh:mm:ss
       !Cmd_Description of ATC Cmd
       ATC Loc nnnn   Cmd_Mnemonic          Submnemonic=Value     yyyy:ddd:hh:mm:ss
       !Cmd_Description of ATC Cmd

yyyy:ddd:hh:mm:ss     ECL Directive from the Ground Script
               !Descriptive Text
yyyy:ddd:hh:mm:ss     /Cmd_Mnemonic                                 Submnemonic=Value
               !Cmd_Description of RT Cmd

       ATC Loc nnnn   Cmd_Mnemonic          Submnemonic=Value     yyyy:ddd:hh:mm:ss
       !Cmd_Description of ATC Cmd
       ATC Loc nnnn   Cmd_Mnemonic          Submnemonic=Value     yyyy:ddd:hh:mm:ss
       !Cmd_Description of ATC Cmd

yyyy:ddd:hh:mm:ss     MSG “  Start of TDRS Contact  “                                    !ECL
Event Msg
yyyy:ddd:hh:mm:ss     AOS:  TDRS_ID  TDRS_Service   Duration       Service_Parameters    !Start
of TDRS Service
yyyy:ddd:hh:mm:ss     #ECL comment describing scheduled load uplink
yyyy:ddd:hh:mm:ss     START LOAD_ATC (Loadname.UPL)
               !Cmd_Procedure Description
yyyy:ddd:hh:mm:ss     /Cmd_Mnemonic                                 Submnemonic=Value
               !Cmd_Description of RT Cmd

       ATC Loc nnnn   Cmd_Mnemonic          Submnemonic=Value     yyyy:ddd:hh:mm:ss
       !Cmd_Description of ATC Cmd

yyyy:ddd:hh:mm:ss     /Cmd_Mnemonic                                 Submnemonic=Value
               !Cmd_Description of RT Cmd

       RTS RTS#       Cmd_Mnemonic          Submnemonic=Value     yyyy:ddd:hh:mm:ss
       !Cmd_Description of RTCS Cmd
       RTS RTS#       Cmd_Mnemonic          Submnemonic=Value     yyyy:ddd:hh:mm:ss
       !Cmd_Description of RTCS Cmd

yyyy:ddd:hh:mm:ss     LOS:  TDRS_ID  TDRS_Service                                        !End of
TDRS Service
yyyy:ddd:hh:mm:ss     MSG “  End of TDRS Contact  “               !ECL Event Msg

************************************************* REPORT END
*************************************************
```

Figure 5-4. Integrated Report File Layout

5.12 Real Time Command Requests

The ASTER IOT may prepare Real Time Command Requests and input these Real Time Command Requests to the ECS IST. A Real Time Command Request is used during non-nominal situations to request execution of a selected command procedure at the EOC, transmission of a specified ASTER command to the spacecraft, or execution of a specified RTCS onboard the spacecraft. The Real Time Command Request must be submitted to the ECS FOT prior to the specified real time contact. The time frame for submitting Real Time Command Requests will be defined in the Operations ICD EOS AM Spacecraft to ASTER.

Real Time Command Requests are input to the ECS IST through the ECS IST GUI. At the request of the ECS IST operator, the Real Time Command Request is sent to the FOT at the EOC for approval. The ASTER IOT and the EOC FOT communicate by voice to exchange information regarding the implementation or rejection of a Real Time Command Request.

The FOS provides command verification status of ASTER real time commands to the ASTER AOS via EOC event messages, as described in Section 5.13 - Instrument Real Time Command Notification and Section 5.14 - Instrument Command Uplink Status.

Note: Since the EOC event messages include the command mnemonic of the ASTER real time command and a time stamp, the ASTER IOT can use this information to correlate specific ASTER real time commands to their corresponding command uplink status.

The contents of the Real Time Command Request include:

a. Subject

b. Originator

c. Subsystem or Instrument ID (ASTER)

d. Spacecraft ID (AM-1)

e. Selected EOC command procedure

   1. Time of execution of the command procedure

   2. Listing of the commands in the Command Procedure and their parameters (arguments)

   3. Instructions. (examples of Real Time Command Request instructions are listed in Table 5-16.)

Table 5-16. Real Time Command Request Instructions

Field	Explanation
Label	Unique identifier for this Real Time Command Request
Type	Type of modification (Add, Delete, Change)
Time	The time of execution of a Real Time Command Request. The time is specified in UTC.
Commanding Mode	Desired command mode (one step, two step)
Commands for Execution	Specifies the real time command to be executed (for example): - individual command mnemonic (including submnemonics and parameter values, or - RTCS identifier
Comments	Text explanation or other useful information provided by the ASTER IOT to the EOC FOT

5.13 Instrument Real Time Command Notification

Instrument Real Time Command Notifications[1] are automatically sent from the EOC to the ECS IST at the ASTER ICC. The purpose of Instrument Real Time Command Notifications are to notify the ASTER IOT that the EOC has issued a command to the ASTER instrument during a real time contact. This command may have been issued from the ground script by the EOC FOT as a result of a Real Time Command Request or by the EOC FOT in response to an instrument contingency situation.

Instrument Real Time Command Notification messages are event messages which consist of a time stamp (indicating the time that the event message was generated at the EOC), an event messages which consist of a time stamp (indicating the time that the event message was generated at the EOC), an event message number (for use in referencing FOS Event Message documentation), the command mnemonic of the command that was issued, including any applicable submnemonics and command parameter values.

Instrument Real Time Command Notification is provided to the ASTER IOT through the ECS IST display console in the form of an event message. The ASTER IOT also may request event message reports using the ECS IST user interface.

5.14 Instrument Command Uplink Status

Instrument Command Uplink Status[2] is automatically sent from the EOC to the ECS IST at the ASTER ICC. The purpose of the Instrument Command Uplink Status is to notify the ASTER

---

[1] In the FOS Requirements Specification for the ECS Project, these notifications are called “Emergency Notification Messages”.

[2] In the FOS Requirements Specification for the ECS Project, these notifications are called “Command Notification Messages”.

IOT of the status (command receipt and/or execution verification) of a command that was issued to the ASTER instrument during a real time contact. The command may have been issued from the ground script by the FOT as a result of a Real Time Command Request or by the FOT in response to an instrument contingency situation.

Instrument Command Uplink Status event messages are event messages which consists of a time stamp (indicating the time that the event message was generated), an event message number (for use in referencing FOS Event Message documentation), and a text status field providing the command uplink status information (see Table 5-17). Instrument Command Uplink Status event messages are generated by FOS software at the EOC; these event messages are distributed to the ECS IST.

Instrument Command Uplink Status is provided to the ASTER IOT through the ECS IST display console in the form of an event message. The ASTER IOT also may request event message reports using the ECS IST user interface.

Note: At the beginning of each TDRSS contact, the EOC's spacecraft state check process uses spacecraft housekeeping telemetry data to verify that all ATC commands (with telemetry verification mnemonics specified in the PDB) that were scheduled since the previous TDRSS contact were properly executed. The EOC will generate an event message for each of these ATC commands which fail EOC spacecraft state check verification. The ASTER IOT may use ECS IST capabilities to request EOC Event History Reports. These IST capabilities will be described in the FOS Operations Tools Manual.

Table 5-17. Instrument Command Uplink Status Information

Event Message Status Field
Command *Cmd_Mnemonic* successfully executed
Submnemonic *Submnemonic* not found in command data base
Invalid value *Value* for *Submnemonic* in command *Cmd_Mnemonic*
Not all submnemonics have been entered for command *Cmd_Mnemonic*
Critical command *Cmd_Mnemonic* canceled by operator
Command *Cmd_Mnemonic* prereq fail: param=*Pvalue*; expected *Value1-Value2* **
Prerequisite check overridden by operator for command *Cmd_Mnemonic*
Command *Cmd_Mnemonic* was not received onboard (lost in transmission)
Unable to confirm receipt of command *Cmd_Mnemonic* onboard (TLM dropout)
Command *Cmd_Mnemonic* received onboard; failed execute verification
Command *Cmd_Mnemonic* received onboard; cannot verify execute (TLM static)
Command *Cmd_Mnemonic* received onboard; cannot verify execute (TLM dropout)

**"param" is the telemetry parameter whose value is checked.
Pvalue is the current value of the telemetry parameter.
Value1 - Value2 is the range of acceptable prerequisite values specified in the EOC data base for command *Cmd_Mnemonic*.

5.15 Operations Status Reports

5.15.1 Spacecraft Status Reports

Spacecraft Status Reports are sent from the EOC to an AOS host computer at the ASTER ICC. The delivery of Spacecraft Status Reports will be accomplished through the use of e-mail services (refer to Section 4.5.3). Status report content, frequency of transmission, and e-mail distribution lists will be negotiated between the ASTER Operations Team (AOT) and the ESDIS EOS Mission Operations Manager (MOM).

5.15.2 Mission Status Reports

Mission Status Reports are sent from the EOC to an AOS host computer at the ASTER ICC. The delivery of Mission Status Reports will be accomplished through the use of e-mail services (refer to Section 4.5.3). Status report content, frequency of transmission, and e-mail distribution lists will be negotiated between the AOT and the ESDIS EOS MOM.

5.15.3 Instrument Status Reports

Instrument Status Reports are sent from an AOS host computer at the ASTER ICC to the EOC. The delivery of Instrument Status Reports will be accomplished through the use of e-mail services (refer to Section 4.5.3). Status report content, frequency of transmission, and e-mail distribution lists will be negotiated between the AOT and the ESDIS EOS MOM.

5.16 Inter-instrument Coordination Messages

Inter-instrument Coordination Messages may be exchanged among the ASTER IOT, other AM-1 IOTs, and the FOT at the EOC. The exchange of inter-instrument coordination messages is accomplished through the use of e-mail services (refer to Section 4.5.3). The content of these messages, frequency of transmission, and distribution of these messages are left to the discretion of the EOC FOT and the IOTs.